2020 Annual Report

China National Petroleum Corporation

About Us

China National Petroleum Corporation (CNPC) is an integrated international energy company with businesses covering oil and gas operations, oilfield services, petroleum engineering & construction, equipment manufacturing, financial services, and new energies development.

Our Goal

To be a world-leading integrated international energy company

Our Strategies

Innovation, Resources, Market, Internationalization, Green & low-carbon

Strategic Pathway

"A three-step approach in two phases"

Phase I (by 2035): Basically achieving high-quality development by 2025; achieving high-quality development in an all-round way by 2030; building a world-leading company in general terms by 2035.

Phase II (2035 to mid-21st century): Scaling a new height every five years towards a world-leading company built to last.

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Message from the Chairman

2020 has been an extraordinary and extremely challenging year for CNPC. From the once-in-a-century COVID-19 pandemic to the deep global economic recession, and to the most dramatic oil price collapse in the petroleum history over a hundred years, we were faced with mounting risks and challenges rising abruptly and various contradictions colliding each other. In the midst of changes and challenges, the board and top management of the company showed firm resolve in implementing the important instructions of Chinese President Xi Jinping as well as the decisions and guidance of the State Council, pooled company-wide efforts and wisdom, employed unusual measures in the unusual time, and delivered exceptional performance with utmost diligence. We accomplished the 13th Five-Year Plan with great success, which went down in the history of CNPC as a chapter of grandeur.

Our targeted approach and strong coordination enabled significant achievements in COVID-19 prevention and control. CNPC takes the safety and health of our employees as the top priority. We set up the CNPC Leading Group of Epidemic Prevention and Control immediately after the outbreak, organized COVID-19 response in a well-conceived way, and put in place a company-wide prevention & control system and a joint prevention & control mechanism that helped to secure the bottom line of no COVID-19 infection in the workplace. Meanwhile, we fully leveraged our industrial and resources advantages to deliver on our core mission of reliably supplying oil and gas. We made a quick production shift to produce COVID-19 prevention materials and feedstock, made donations to hard-hit regions, sent CNPC medical teams to Hubei Province, mobilized thousands of service stations to provide daily necessities for local communities, and worked to support social employment through our spring recruitment. All these efforts spoke volume about our underpinning role as a major SOE.

We focused on high-quality growth of core businesses, and realized constant improvement in capabilities to guarantee energy supply. To conscientiously act in line with Chinese President Xi Jinping's instructions on putting more emphasis on domestic exploration and development, we implemented the seven-year-action plan and achieved "three 100-million tons", namely a stable domestic crude output of 100 million tons with increase, a record high 100 million tons of natural gas output in oil equivalent, and an overall stable volume of 100 million tons of oil and gas equivalent from overseas equity production. Structural adjustment of refining and chemicals business saw notable progress. Performance of marketing segment was improved in every dimension. Market shares of supporting businesses were expanded against the downtrend.

Focusing on bottlenecks, we enhanced reforms and innovation to fully unleash the vigor for development. CNPC continued to give innovation a pivotal role in its overall development. We formed a leading group to support the R&D of core technologies, explored and then introduced a competition mechanism to select best candidates to lead research projects. The company also tied innovation partnerships, strengthened debottlenecking efforts in key projects, and scored a number of landmark innovation results.

We set up Kunlun Digital Technology Company, which enabled digitalization to pick up pace. We also launched a special research program to promote modernizing corporate governance system and capacity, drew up and acted on the three-year-reform action plan, made breakthroughs in crucial areas and key links, and successfully concluded equity participation in PipeChina as well as the transaction of our pipeline assets.

We took active actions on green and low-carbon development, and sped up efforts in rolling out natural gas and new energies business. CNPC included "green and low-carbon" into its corporate development strategies, which spelled out the orientation for future transition. The company deems speeding up gas development as an important approach and key target for environmental protection and for building a clean, low-carbon, safe and efficient energy mix. In the year, we further added new reserves and increased production. The output of domestic gas in oil-equivalent surpassed that of crude, registering a milestone progress in adjusting our production mix. CNPC actively delivers on the "carbon peak" and "carbon neutrality" pledges of the Chinese government, and sets its target at "near zero" emissions in 2050, with more efforts in rolling out new and renewable energies.

We actively engaged in international cooperation to forge an oil and gas community of shared interests. The company remains committed to promoting opening-up and cooperation, as well as to the concept of "extensive consultation, joint contribution, and shared benefits" in international cooperation. We continued our communications and collaborations with partners online and offline, and exchanged observations regarding new opportunities and new measures in oil and gas cooperation against the backdrop of COVID-19, contributing our insights on creating a new order and new paradigm for the international energy industry. The Third CNPC International Cooperation Forum was held successfully, attracting delegates from dozens of renowned international companies and industry top players from around the world.

Strong CSR commitments continued to contribute to the corporate image. With concrete efforts in safe production and green development, CNPC continued to operate in an eco-friendly way. Throughout 2020, there was zero occurrence of significant industrial and environmental incidents, showing an ever improving HSE profile. We worked all out to support and join the national poverty alleviation endeavors. Fifteen counties, cities and districts receiving paired-up assistance from CNPC have all shaken off poverty as scheduled. The company has been granted the top rating "good" on poverty relief by the central government for three consecutive years, and won the 2020 National Poverty Alleviation Award. Being people-centered, we strive for a growth that is shared by the company, the society, as well as our employees. Consequently, CNPC is enjoying a more favorable environment for development both internally and externally.

2020 is the finale of our 13th Five-Year Plan. After five years of tireless efforts, CNPC has fulfilled all the set tasks and targets. The past five years witnessed a total turnover of RMB 11.8 trillion and sustained improvements in our comprehensive strength and international competitiveness. CNPC ranks 4th on Fortune Global 500 and 3rd among top 50 oil companies, fulfilling our goal for scaling a new high on the path to a world-leading integrated international energy company. Meanwhile, we have made significant contributions to China's energy security and the establishment of a moderately prosperous society in an all-round way.

These achievements didn't come easy. On behalf of the board of directors and the top management team, I would like to express sincere gratitude to the entire staff of CNPC and the whole society for their confidence and great support.

2021 marks the beginning of China's 14th Five-Year Plan. China is embarking on the new journey to fully build a modern socialist nation and marching towards the second centenary goal. Profound changes unseen in a century are evolving in accelerated paces. The international landscape continues to display complexities. In the energy sector, electrification, marketization, digitalization and green revolution are just unfolding, and the transition of the industry is stepping up. Embracing China's new development stage, international landscape adjustments and energy transition, we will maintain the strategic focus, hold on to a systematic perspective, reinforce forward thinking, overall planning, strategic deployments and holistic advancement, and vigorously deliver on the corporate strategies of "innovation, resources, market, internationalization, green and low-carbon".

CNPC will hold true to our long-term strategy of quality growth, keep deepening supply-side structural reform, take reforms and innovation as the key driver, and add values by pursuing green development and supplying reliable energy to fuel the growth of our customers and power people's happy life. We will strive for a development that is more efficient, equitable, sustainable, safe and high-quality, as a way to make our due contributions to support China's energy security, help shape the new development paradigm, and seize new victories in building a modern socialist China in an all-round way.

Chairman

Dai Houliang

President's Report

Turnover

2,087.1 billion RMB yuan

Earnings before taxes

87.5 billion RMB yuan

In face of the severe impact and various challenges in 2020 brought by the onslaught of COVID-19 globally, the plummeted international oil price and the drastic shrink of domestic refined products market, the company showed firm resolve in implementing the decisions made by the central government and the requirements of the Board. We promoted coordinated advancement in epidemic prevention and control, work and production resumption, business operation, as well as reform and innovation. We vigorously improved quality and efficiency, effectively put epidemic under control and ensured profit-making. We showed strong resilience with operation along the whole value chain remained stable and performance better than expected, accomplishing the tasks under the thirteenth-five-year plan. Our turnover in 2020 was RMB 2,087.1 billion and earnings before taxes were RMB 87.5 billion.

Significant achievements were registered on COVID-19 prevention and control, and HSE performance was stable and making headway. As part of the deployments and requirements by the CNPC Leading Group of Epidemic Prevention and Control, we put our employees' life and health at the top priority, launched top level response immediately after the outbreak, and built a joint prevention and control mechanism that pooled and coordinated efforts across the company in a highly efficient and prompt way. We advanced work on epidemic control and production restoration with well-conceived approaches and in good order, which safeguarded lives and health of our employees, their family members, contractors, service providers as well as our communities. We fully leveraged our industrial and resources advantages to render strong support and played an important role in the national efforts for containing the virus. Rooted in the concept of "people-oriented, quality utmost, safety first and environmental protection prioritized", the company strengthened the integrated review on QHSE performance, implemented the three-year-action plan on special rectification for safety production, beefed up supervision on key areas, and earnestly sorted through and fended off risks and potential hazards. No major and above production accidents were recorded in the past year. We also paid high attention to energy conservation and consumption reduction, and saved 790,000 tons of standard coal and 10.33 million cubic meters of water in 2020.

Marvelous results were attained in domestic E&P, and oil and gas production scaled up a new high. To conscientiously act in line with the Chinese President Xi Jinping's instructions on putting more emphasis on domestic exploration and development, we implemented the seven-year-action plan and pooled our strength on the said task to gain initiative in oil and gas production. We registered many strategic breakthroughs and important exploration achievements in areas such as Sichuan, Ordos, Junggar and Tarim, and discovered and proved nine 100-million-ton level oil reserves and nine 100 billion-cubic-meter level gas reserves. We also saw 872.53 million tons of newly added proven oil reserves in place and 648.3 bcm of newly added gas reserves in place. On the production side, the company focused on efficient production capacity building in new areas, and effectively controlled depletion rate of matured oil and gas fields to enhance their recovery. Our domestic oil and gas equivalent production of 2020 recorded 200 million tons for the first time in history reaching 206 million tons. Oil output was 102.25 million tons, slightly increased while maintaining stability. Gas output was 130.6 bcm, exceeding 100 million tons of oil equivalent and outrunning oil for the first time. Our oil and gas production mix was further optimized and we have made remarkable progress on green and low carbon development.

Refining and chemicals business structure underwent steady adjustment, with efforts on reducing refined products and increasing chemicals bearing new fruits. We stayed market-oriented and profit-driven, soundly arranged refining as well as chemicals production and sales, so as to improve profitability through resources optimization and structure adjustment. We made great efforts in reducing refined products

and increasing chemicals, properly adjusted diesel to gasoline ratio, and produced more high efficiency and high value-added products. In 2020, the company's crude runs stood at 160.02 million tons and refined products output was 107.23 million tons. The refined products yield was cut by 3.5 percentage points compared with the annual plan. We maintained high load operation of key chemical units with 6.35 million tons of ethylene produced in China, up 8.2%. We developed and produced 87 grades of new chemicals, and realized notable production growth for PX, synthetic resin and synthetic rubber. Chemicals marketed in China reached 36.66 million tons. Key projects such as the integrated refining and chemicals project of Guangdong Petrochemical Company and the ethane-to-ethylene projects in Changqing and Tarim were progressed steadily.

Marketing business ensured stable sales, sustaining a smooth operation along the industrial chain. In response to severe challenges of a weak market, the company took active actions to better coordinate production and marketing, and ensured that sales of refined products were stable and the overall profitability was maximized. In line with market realities, we promptly adjusted marketing strategies and carried out tailor-made marketing for different regions, varieties, products, time and customers. We piloted the Amoeba business model and emphasized on increasing retail sales via fueling guns and improving marketing quality. In 2020, we sold 106.51 million tons of refined products in China. Efforts were made to strengthen the integrated growth of fuels and non-fuel business, promote online and offline sales in a coordinated way, and accelerate cross-sector cooperation. Our revenue from domestic non-fuel business grew by 7% year-on-year.

Natural gas marketing expanded in both volume and profits, and steadily improved capacity in peak-shaving and supply. In face of staggering market growth and mounting competition, we continued to optimize resources portfolio and allocation, enhanced the development of lucrative and high-end markets, and adopted multiple measures to expand market. While pushing for more gas consumption from key areas and large users, we moved faster to bring our own end-user facilities and new direct-supply customers on stream, and carried out pilot marketing around oil and gas fields. We effectively reversed the sales decline in the first half of the year, and sold 184.7 bcm of natural gas in China in 2020, up 1.9% year-on-year. The construction of key storage and transport facilities such as Jingtang LNG terminal and Jiangsu LNG terminal was proceeding smoothly, and that of Hutubi gas storage expansion project, among others, was accelerated, adding 1.8 bcm per annum storage capacity. Focusing on demand-side management, we worked out winter supply contingency plan in advance to ensure safe and stable supply to key areas and users.

Overseas oil and gas cooperation made steady progress, and the role of international trade was brought into effective play. Amid the raging global COVID-19 pandemic and growing geo-political risks, our overseas projects withstood pressure and mounting difficulties, ensured zero infection in workplaces and well-organized work resumption and staff relocation, achieving sound production and operation performance. Over 500 million tons of proven oil reserves in place were newly added in Buzios project in Brazil, and important exploration discoveries were realized in Chad, Niger and Kazakhstan. In general, our oil and gas production was stable with over 100 million tons of oil and gas equivalent equity output. Progress was also made in new project development and joint ventures. We completed the transactions of Aram project in Brazil and Abu Dhabi Offshore project, signed extension agreements for production blocks, and further optimized business portfolio. In international trade, we enhanced sales of overseas equity oil, calibrated the timing of importing natural gas, gave flexibility to refined products export, and explored overseas market for chemical products. With efforts made to hedge against price risks, the company saw steady improvement in service, marketing and transaction capability and realized a trade volume of 490 million tons in 2020.

Supporting businesses showed strong momentum with an increased market share against the downtrend. Oilfield service business furthered efforts in the R&D and application of new technologies, continued to enhance quality, speed, production and efficiency to support E&P business. With vigorous market expansion, we were awarded many important service projects. Our engineering and construction business strengthened whole-process management and saw key projects proceeding smoothly. A number of belt and road interconnectivity projects were put into operation, such as the mid-section of the East-Route of Russia-China Gas Pipeline. Financial service business pressed ahead with financial-industrial combination and synergy-achieving among various financial operations. Risk control was reinforced to better serve our core business and clients along the industrial chain. Equipment manufacturing business focused on lean management, actively explored the new business models of "manufacturing + service" and "product + service", and achieved improvements in production efficiency, product quality, business structure and profit-gaining.

Reform and innovation made concrete progress with notable results in improving quality and efficiency. The company stayed committed to the key deployments of the central government on reforming SOEs and the oil and gas industry, successfully concluded the spin-off and transaction of oil and gas pipelines of PetroChina. We drew out and acted on the three-year reform action plan based on the company's arrangements to promote corporate governance system and capacity building. Annual targets were fulfilled across the board regarding the socialized management of retirees, divestment and transfer of utilities, heating and property management services for employees, as well as the reform of "big collectives" affiliated to our enterprises. We placed high value on innovation and carried out a number of major R&D programs and debottlenecking projects for core technologies. Sound progress was made on continental shale oil development and million-ton level ethane-to-ethylene technologies. We set up the Kunlun Digital Technology Company and delivered IT projects like the industrial internet platform. Application of information systems like ERP and data warehouse kept deepening, and digitalization and smart development were stepped up. We made vigorous efforts to improve quality and efficiency through prudent budgeting in operation, careful planning in production, targeting fineness in management, and seeking excellence in technology. Major cost indicators registered solid declines, contributing to the company's annual profit by RMB 32 billion. We formulated CNPC 14th Five-Year Development Plan in line with the guiding principles set by the central government.

2021 marks the beginning of China's 14th Five-Year Plan. That China deepens reforms and opening up, works to expand domestic demand, further improves business environment, and encourages the development of real economy, will help to create an enabling environment and conditions for the growth of businesses. In this year, CNPC will fully implement the new development concept, seize the important window of opportunities for development, apprehend the new dynamics of opportunities and challenges, set the bottom-line thinking, strengthen awareness for opportunities and risks, shore up confidence for victory, focus on business development, and firmly hold on to the initiative of production and operation, to ensure that the 14th Five-Year Plan is off to a good start. CNPC remains committed to building a world-leading integrated international energy company with high quality, and making new contributions to underpin China's energy security and economic growth.

President

Li Fanrong

Operation Highlights

	2018	2019	2020
Financial Index			
Turnover (billion RMB yuan)	2,739.0	2,771.4	**2,087.1**
Earnings before taxes (billion RMB yuan)	110.6	120.4	**87.5**
Net income (billion RMB yuan)	42.8	59.6	**50.3**
Taxes and fees paid globally (billion RMB yuan)	421.2	404.5	**315.8**
Oil and Gas Production			
Oil production (mmt)	176.37	181.03	**178.64**
Domestic	101.02	101.77	**102.25**
Overseas (Equity)	75.35	79.26	**76.39**
Gas production (bcm)	138.02	150.30	**160.35**
Domestic	109.37	118.80	**130.60**
Overseas (Equity)	28.65	31.51	**29.75**
Refining and Chemicals			
Crude runs (mmt)	207.36	207.97	**191.83**
Domestic	162.36	168.44	**160.02**
Overseas	45.00	39.53	**31.81**
Domestic refined products output (mmt)	112.91	119.13	**107.23**
Domestic lube oil output (mmt)	1.60	1.63	**1.58**
Domestic ethylene output (mmt)	5.57	5.86	**6.35**
Marketing and Sales			
Domestic refined products sales (mmt)	117.36	119.59	**106.51**
Domestic service stations	21,783	22,365	**22,612**
Domestic natural gas sales (bcm)	172.42	181.29	**184.66**

Corporate Governance

CNPC is a solely state-owned enterprise. According to the provisions of laws and regulations such as the Company Law of the People's Republic of China, the Law of the People's Republic of China on State-owned Assets in Enterprises, as well as arrangements made by the State-owned Assets Supervision and Administration Commission of the State Council, CNPC has built and continuously improved the legal person governance structure in which Board of Directors and top management coordinate effectively for sound decision-making, and each carries out duties within clearly defined rights and responsibilities.

Board of Directors

The Board of Directors as the decision-making body of the company has four affiliated committees, the Strategy & Development Committee, the Nomination Committee, the Remuneration & Evaluation Committee and the Audit & Risk Management Committee, which serve to provide advice and suggestion to support the decision-making of the Board.

According to the Articles of Association of CNPC and Board of Directors Authorization Management of CNPC, the Board of Directors issues conventional authorization on decision-making regarding corporate operations to the Chairman.

Dai Houliang
Chairman

Li Fanrong
Director

Duan Liangwei
Director

Wang Jiuling
External Director

Liu Guosheng
External Director

Yang Hua
Employee Director

Top Management

Dai Houliang
Secretary of the CPC Leading Group,
Chairman

Li Fanrong
Deputy Secretary of the CPC Leading Group,
President

Duan Liangwei
Deputy Secretary of the CPC Leading Group

Liu Yuezhen
Member of the CPC Leading Group,
Chief Financial Officer

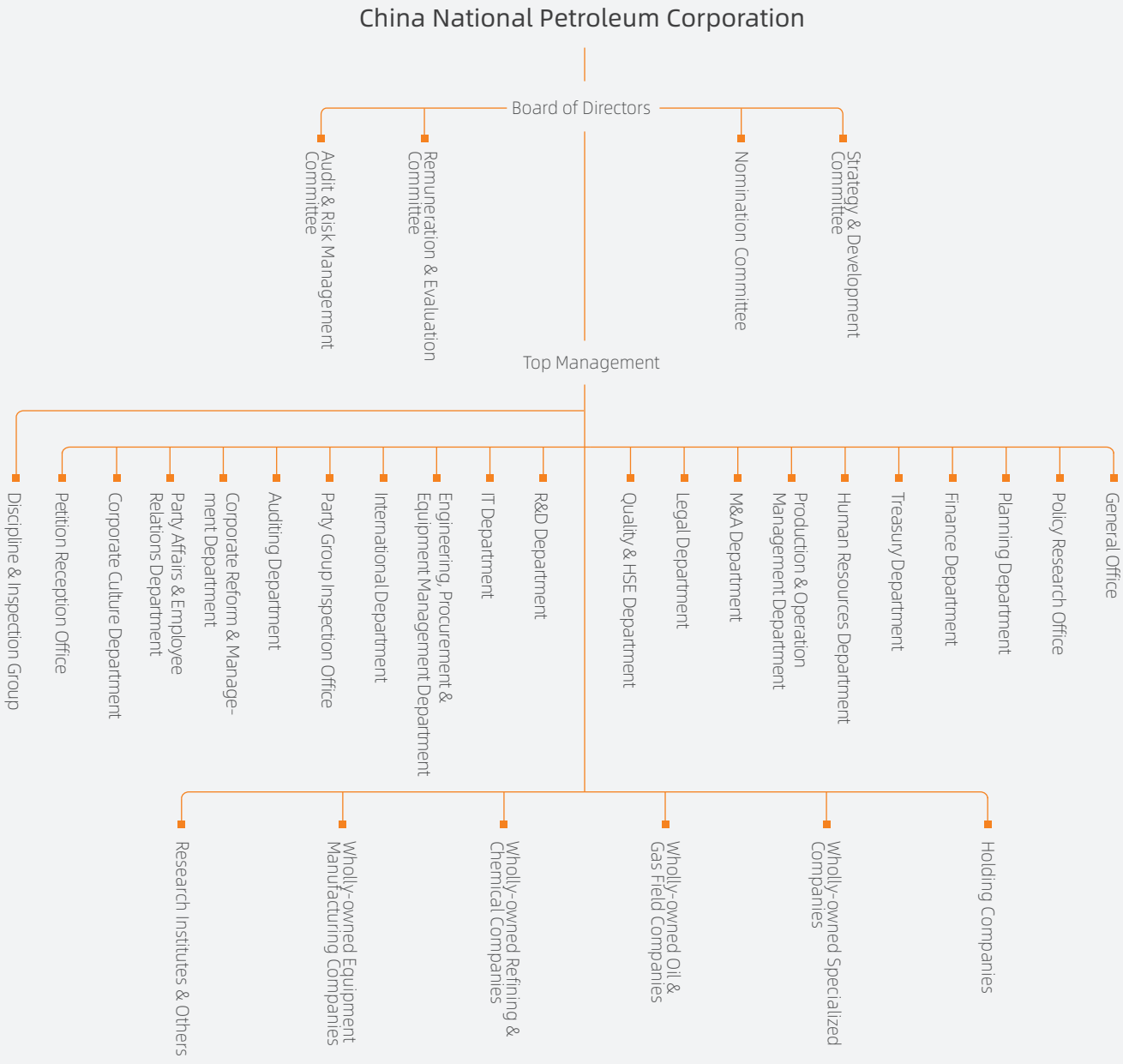
Lyu Bo
Member of the CPC Leading Group,
Vice President

Jiao Fangzheng
Member of the CPC Leading Group,
Vice President

Xu Jiming
Member of the CPC Leading Group,
Chief of Discipline & Inspection Group

Huang Yongzhang
Member of the CPC Leading Group,
Vice President,
Chief HSE Supervisor

Organization (By the end of 2020)



Key Topics

1 An Overview of the 13th Five-Year Plan Period

The year 2020 has witnessed the successful ending of the 13th Five-Year Plan (2016-2020). In the past five years, we have achieved remarkable results in various areas such as green and low-carbon development, corporate governance, technological innovation and business transformation, E&P efforts, opening-up and cooperation, and poverty alleviation.

Corporate Governance

We continued to deepen the reform of state-owned enterprises and improve corporate strategy system. Significant results have been achieved in optimizing management system and mode, improving institutional system, splitting off social services function and dealing with the legacy problems.

During the 13th Five-Year Plan Period:

14

Pilot reforms were conducted on decentralizing administration to 14 subsidiaries.

100+

Averagely, there were more than 100 outstanding management innovations every year.

1.4 million

Utilities and property management services for approximately 1.4 million employees' households were split off and handed over.

Technological Innovation

We maintain a strong commitment to the innovation strategy to further improve our innovation capabilities and core competences. Technological innovation achievements have been made successively, playing a significant role in the company's high-quality development.

During the 13th Five-Year Plan Period:

61.4%

The contribution rate of technological progress reached 61.4%.

17

Our 17 technological innovations received national scientific and technological awards.

30,000+

We filed more than 30,000 patent applications, of which 56% are invention patents, including 23 award-winning patents.

20

20 international standards were formulated or revised, including seven new international standards.

Exploration and Production

A number of major discoveries and breakthroughs resulted in a steady rebound in our crude production and a boost in our natural gas business.

20

During the 13th Five-Year Plan Period, 20 strategic breakthroughs and discoveries were achieved, identifying 11 100-million-ton crude plays and 12 100-billion-cubic-meter natural gas plays in China.

200 million tons

In 2020, our domestic oil and gas production exceeded 200 million tons of oil equivalent for the first time.

102.25 million tons

In 2020, we produced 102.25 million tons of crude oil in China.

130.6 billion cubic meters

In 2020, we produced 130.6 billion cubic meters of natural gas in China, up 36.8% from 2015.

Refining and Chemicals

The transformation and upgrading of the refining and chemicals business was accelerated, and remarkable results have been achieved in reducing refining products output and increasing chemicals output.

203 million tons

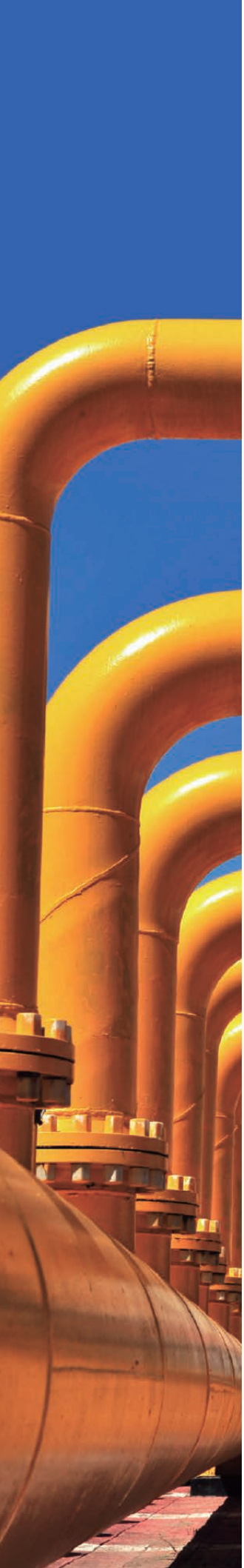
Our annual crude processing capacity increased from 184 million tons in 2015 to 203 million tons in 2020.

1.1

The diesel to gasoline ratio dropped from 1.61 in 2015 to 1.1 in 2020.

26.3%

In 2020, our chemicals production increased by 26.3% compared with 2015.



Refined Products Marketing

Our marketing capabilities and sales performance continued to improve by proactively exploring market and highlighting profitability.

22,612 stations

As of the end of 2020, we had a total of 22,612 service stations in China.

100 million tons

During the 13th Five-Year Plan Period, our sales of refined products in China stood above 100 million tons annually.

101 million users

In 2020, the number of registered users of our online retail platform reached 101 million.

No.1

According to the China Brand Power Index (C-BPI) Report released by brand rating and consulting institute Chnbrand, CNPC ranked the first among China's fuel retailers for the fourth consecutive year.

Natural Gas Marketing

The pace of building a comprehensive system for production, storage and distribution picked up to facilitate high-quality development of the natural gas business and promote a better energy mix in line with the goal of Beautiful China.

184.7 bcm

In 2020, our gas sales in China reached 184.7 billion cubic meters.

12.358 million users

As of the end of 2020, the number of domestic end users reached 12.358 million.

76,600 kilometers

As of the end of 2020, the length of city gas pipelines in operation totaled approximately 76,600 kilometers.

19.3 million tons

As of the end of 2020, we had three LNG terminals and one storage facility in operation with an annual LNG receiving capacity of 19.3 million tons.

International Oil and Gas Cooperation

We are committed to opening-up and cooperation focusing on Belt and Road countries and kept improving our international business layout and enhancing management competencies.

35

As of the end of 2020, we had oil and gas investment projects in 35 countries/regions around the world.

2.4 billion tons

During the 13th Five-Year Plan Period, our international trade volume totaled more than 2.4 billion tons, covering over 80 countries and regions.

3 years

We participated in the China International Import Expo and held the CNPC International Cooperation Forum & Signing Ceremony for three consecutive years from 2018 to 2020.

Green and Low-carbon Development

CNPC has been actively addressing climate change and following eco-friendly practices in the spirit of "lucid waters and lush mountains are invaluable assets" to ensure clean and low-carbon production and sustainable development.

>50%

In 2020, our full-year domestic gas production accounted for more than 50% of our total domestic oil and gas production for the first time, indicating an optimized energy mix and important headway towards green and low-carbon transition.

9.65%

In 2020, our domestic GHG emissions per unit of oil and gas production decreased by 9.65% compared with 2019, among which the methane emission intensity decreased by 6% from the previous year.

4.3 million tons of standard coal

During the 13th Five-Year Plan Period, we reduced energy consumption by 4.3 million tons of standard coal and 59.1 million cubic meters of water in the aggregate.

Poverty Alleviation

We have developed a human-oriented poverty alleviation model focusing on industry, livelihood, education and medical care to foster sustainability in impoverished regions under the national poverty alleviation initiative.

During the 13th Five-Year Plan Period:

RMB **1.8** billion

We spent a total of RMB 1.8 billion in poverty alleviation.

2,800+

Over 2,800 poverty alleviation projects were implemented.

1,175

Our poverty alleviation efforts covered 1,175 villages across the country.

100%

100% of the counties (townships and districts) under our paired-up assistance were lifted out of poverty.

Key Topics

2 Fighting COVID-19 – CNPC in Action

In face of the COVID-19 onslaught in the beginning of 2020, we set up the CNPC Leading Group of Epidemic Prevention and Control immediately after the outbreak to work with the government, employees, business partners, local communities and customers to fight against the pandemic efficiently and persistently. In addition to controlling the pandemic inside CNPC and resuming production, we played an active role in the country's fight against the pandemic by ensuring refined products and natural gas supply in key areas, shifting production in medical supplies, distributing daily necessities in local communities through our service stations and convenience stores, and facilitating the post-pandemic economic recovery.

In 2020, we achieved "zero infection" in the workplace, effectively safeguarding the safety and health of our employees. We donated an aggregate of RMB 104.53 million of anti-epidemic funds and materials home and abroad, switched to and expanded the production of 657,000 tons of medical materials, produced 1,259 tons of melt-blown materials and over 800 tons of melt-blown nonwovens, and produced 146 million face masks. We strengthened investment cooperation and employment opportunities in key areas of the epidemic outbreak, providing jobs for college graduates and migrant workers and employing 3,000 more people than in 2019.

We believe that, as the world comes together to fight the pandemic, mankind will triumph over coronavirus and usher in a brighter future. CNPC will continue to join hands with all stakeholders in pandemic control and economic recovery, and make due contribution in safeguarding people's health and ensuring a steady and booming economy.

Donations for COVID-19 Prevention and Control	■ We made RMB 104.53 million worth of donations for pandemic control at home and abroad. ■ In January 2020, we donated RMB 50 million to the Hubei Charity Federation. ■ From February to April 2020, we provided natural gas worth RMB 20 million free of charge to 39 hospitals treating COVID-19 patients. ■ We mobilized resources from our subsidiaries to provide Wuhan with much-needed supplies such as protective suits, medical masks, disinfection products and daily necessities. ■ Our employees donated more than RMB 70 million to support the COVID-19 battle in Hubei.
Oil and Gas Supplies	■ We ensured supply round the clock at all our service stations during the lockdown of Wuhan by mobilizing and coordinating all the available channels in Hubei Province. ■ As of April 8, 2020, the end of lockdown measures in Wuhan, our 625 service stations in Hubei delivered a total of 226,500 tons of fuels and 1.2 billion cubic meters of natural gas to the local communities.
Energy Supply for COVID-19 Treating Hospital Construction and Operation	■ We managed to relocate a 300-meter gas pipeline in eight hours for the Huoshenshan Hospital and rapidly installed 1,802 meters of temporary pipelines for COVID-19-treating hospitals in Huangshi, Shiyan and other regions. ■ We delivered 26.12 tons and 120.58 tons of fuels respectively, to the construction site of the Huoshenshan Hospital and the makeshift hospitals.
Livelihood Supplies	■ An optimized sourcing and distribution plan was launched as part of emergency response to provide daily necessities and relief supplies on an ongoing basis through our service stations and convenience stores during the lockdown of Wuhan. ■ We delivered 10,800 orders for much-needed livelihood goods placed by local residents in Hubei.
Production of Medical Supplies	■ Through quick response of our research institutes and production subsidiaries, we made an adjustment to our chemicals production plan to make sure the polypropylene units ran at full capacity and produced 657,000 tons of feedstock for medical supplies. ■ We put into urgent operation a number of production lines for face mask and melt-blown fabric to produce a total of more than 800 tons of melt-blown fabric and 146 million face masks throughout the year.
Post-pandemic Economic and Social Recovery in Hubei	■ The spring recruitment was launched to provide job opportunities for college graduates and migrant workers, especially those from Hubei. The number of new hires was 3,000 more than a year ago. ■ We implemented a strategic cooperation agreement with the Wuhan Government to strengthen cooperation in key projects and provide support for economic recovery. ■ We purchased and sold nearly RMB 20 million worth of local agricultural products from Hubei through uSmile convenience stores and online platforms in two months.
Assistance in Pandemic Control in Overseas Communities	■ We donated COVID-19 supplies worth more than RMB 75 million to many countries. ■ We provided services on COVID-19 control and released "staying safe and healthy" videos; exchanged experience and measures in response to the pandemic with international peers; and shared information on pandemic control with embassies, local governments, media, and business partners. ■ Our Halfaya project in Iraq compiled an Arabic version of COVID-19 prevention and control handbook, distributed more than 15,000 copies of this handbook door to door in seven villages within the oilfield area, and patiently briefed the villagers on epidemic prevention and control knowledge. ■ We offered COVID-19 training in local communities, distributed COVID-19 supplies and provided temporary isolation sites. ■ We promptly collected 20,000 medical surgical masks, 500 bottles of disinfectant hand sanitizer, 100 suits of protective clothing, 20 medical thermometers and other epidemic prevention materials to assist the Federal Ministry of Electricity and Energy in Myanmar in epidemic prevention and control.

2020 Industry Review

In 2020, the global economy tumbled into severe recession due to the ongoing COVID-19 pandemic, frequent extreme natural disasters and unilateral trade protectionism. The energy industry was hit hard. The petroleum and petrochemical sector, being badly affected, experienced the darkest of moments. Looking ahead, with challenges there come opportunities. The oil and gas industry will remain resilient while navigating through the tough times.

Global Oil and Gas Industry

World energy consumption experienced the first decline in nearly a decade with new energies growing against economic downtrend. The year 2020 witnessed a contraction in the world economy and a decline in global energy consumption for the first time in nearly a decade. In particular, fossil energy consumption decreased by 6.1% year-on-year and non-fossil energy consumption increased by 3.3%. The Asia-Pacific region still accounted for a big part of global energy consumption. The transition to clean energy saw a shift from capacity expansion to quality improvement. Coal consumption and oil consumption continued to decline more or less. Non-aqueous renewable energies performed well and hydrogen energy received great attention. So far, dozens of countries have announced their carbon neutrality goals and action plans. Major IOCs have formulated their roadmaps for low-carbon transition. It is expected that in the next three to five years, carbon neutrality will be at the heart of changes for the energy industry to enter into a new development era.

The world saw a record decline in oil supply as well as demand, inventories at record-high levels and oil prices plunging below zero for the first time. In 2020, oil prices rebounded after a sharp slump but remained volatile. Brent crude futures averaged at USD 43 per barrel in 2020, with a 33% drop from the previous year. WTI crude oil futures prices plummeted below zero on April 20 due to limited available storage capacity at delivery location and first line contracts expiring, trading as low as USD -40 per barrel, marking the most unbelievable event in the history of oil futures. It was a big blow to the world oil market. The OPEC+ alliance implemented the most aggressive production cuts in history. Meanwhile, the demand and supply of oil dropped at record-setting paces throughout the year compared with 2019. Given the decline in demand significantly greater than the decline in supply, the global oil supply surplus jumped to 2.9 million barrels per day in 2020, pushing world inventories to a record high.

The global natural gas market dropped in both supply volume and price with investments and trading in this sector taken a big hit. Global natural gas consumption declined for the first time in the new millennium with a notable slide in North America and Europe and a slowdown in the Asia-Pacific region. Natural gas production also shrank as major natural gas-producing countries reduced their outputs. Natural gas prices hit a record low in major markets. The global trade volume of natural gas dropped with evident slowdown in LNG trade. LNG contracts were featured by shorter terms, less volumes and lower slopes indexed to oil prices.

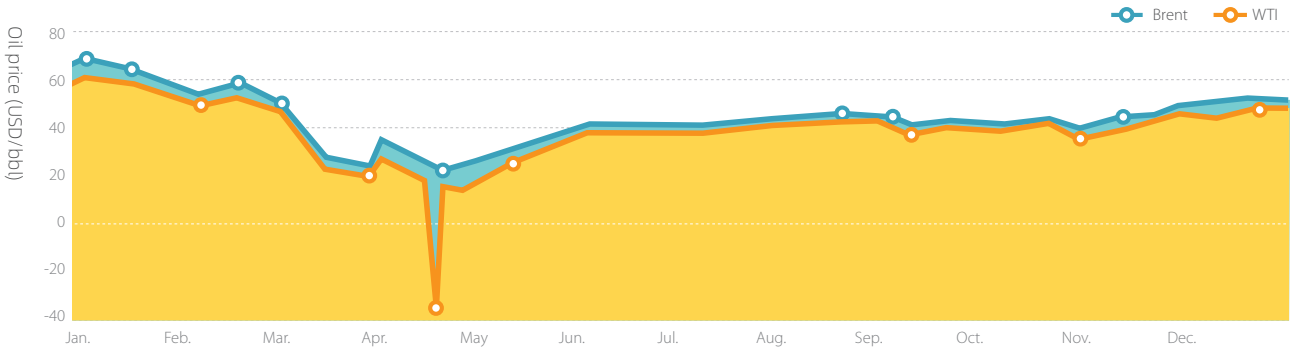
There was a significant decrease in oil and gas reserves discovered globally with E&P investments heading downwards. Global E&P investments shrunk significantly by 30%. There were fewer major oil and gas discoveries with newly discovered reserves standing at 10-year lows. The world's total oil reserves declined slightly and total natural gas reserves rose mildly. As a result of production restraint and declining demand, both oil and gas outputs shrank, with oil production falling at a faster pace than natural gas.

The global capacity growth in refining and ethylene slowed down notably with key indicators far inferior to those of the previous year. There was a notable slowdown in the world's refining capacity growth. With new capacity additions mainly located in China, the Asia-Pacific region continued to lead in terms of refining capacity. As nations around the world were forced into lockdowns during the pandemic, the demand for refined products contracted dramatically and the year saw an 8.9% decline in crude runs. The average utilization rate of global refinery capacity dropped to around 72%, the lowest in history. Ethylene capacity additions slowed as capacity utilization declined from 90% in the previous year to around 85%.

Transaction volume and amount of oil and gas assets slumped and U.S. saw a wave of M&A activities in the shale sector. The transaction amount of upstream assets plummeted by 63% year-on-year to a 15-year low, and those of downstream assets, mainly in the marketing and chemicals domain, dropped by 47%. A new wave of mergers and acquisitions were seen in the U.S. shale sector including a number of big deals.

China's Oil & Gas Industry

The shift towards a green and low-carbon economy accelerated amid a slowing growth in energy consumption. In 2020, as China's COVID-19 outbreak was brought under control in a rapid manner, the Chinese economy showed a V-shaped recovery



Price trend of international crude oil futures in 2020

and grew at 2.3% year-on-year, making it the only major economy that achieved positive economic growth in 2020. Energy consumption continued to grow nationwide at a slower pace compared with 2019. The proportion of coal in the country's energy mix continued to head downwards amidst the shift to cleaner energy; the share of clean energy (natural gas and non-fossil fuels) in the total energy consumption was 0.9 percentage points higher than a year earlier. The shift to a green and low-carbon energy mix continued to make headway. Power generation from non-fossil fuels grew at 8.4% year-on-year. Newly added installed capacity of power generation from renewable energies accounted for approx. 70% of China's total additions throughout the year.

The domestic oil market was hit hard and market players managed to pull through. In 2020, the domestic oil market suffered the biggest blow since the Asian financial crisis in 1998. China's crude runs growth dropped by 4.6 percentage points; the actual consumption of refined products decreased by 0.8% year-on-year; and net exports fell below 42 million tons. Against such a backdrop, domestic market players managed to navigate through this difficult situation with a few bright spots: increasing domestic crude production; optimizing sourcing and crude imports arrangements; increasing the output of products well accepted by the market and improving marketing management; pushing ahead with the reform of refined product prices; and promoting Big Data, cloud computing, AI, 5G, smart service station, digital trade platform and Internet of Things. New business forms and models in marketing was in a boom.

Growth in natural gas consumption slowed and the domestic market remained loose at large. Natural gas consumption increased by 7.1% year-on-year in 2020, indicating a slowdown compared with 2019. Natural gas supply increased by 6.8% from a year earlier and supply-demand situation was eased as a whole. The proportion of natural gas in primary energy consumption climbed slightly to 8.7%. Natural gas import growth slowed significantly in which LNG accounted for a larger proportion. In particular, pipeline gas imports showed a contraction for the first time. We continued to press ahead with the construction of domestic natural gas production, storage and distribution system. PipeChina was officially in operation, which enabled great progress on pipeline connectivity.

Domestic oil and gas outputs continued to grow and the pressure to increase both reserves and production built up. Domestic oil and gas producers expanded their E&P efforts to ensure national energy security, with a focus on strategic and high-potential areas. High-quality production capacity was exploited to achieve growth in both reserves and production amid a challenging environment. Given the impact of the pandemic and the oil price crash, the three oil majors, i.e. CNPC, Sinopec and CNOOC, revised their upstream capex by a large margin, which stood at approx. 20%.

Refining/ethylene capacity continued to grow as the pandemic weighed heavily on the operations. There was a continuing ramp-up in the domestic refining/ethylene capacity. In particular, ethylene capacity based on separation of light hydrocarbons grew at a fast pace, marking a booming year for gas-based ethylene projects. COVID-19 affected refineries saw a rapid recovery after a sharp decline in the first quarter of 2020 and experienced a bumpy year for operation: Crude runs continued to increase; the overall utilization and diesel to gasoline ratio remained stable throughout the year. Meanwhile, refining profits, refined product output and net refined product exports fell. Private and foreign-funded refineries kept emerging, and the market with a wider variety of participants saw further competition underway.

Structural reform in the oil and gas sector made headway as energy transition sped up under the "carbon peak & carbon neutrality" goal. In 2020, China pushed ahead with the opening of its oil and gas sector across the entire value chain as the legislative process moved forward steadily in the energy industry. A number of laws and regulations were issued or enacted, including the Energy Law of the People's Republic of China (Draft for Comment), and the Resource Tax Law of the People's Republic of China to provide a legal guarantee for promoting the transition to clean and low-carbon energy, facilitating shale gas development, enabling market access to the refining sector and deepening the natural gas reform etc. At the UN General Assembly, President Xi Jinping announced China's goal of "have carbon peak before 2030 and achieve carbon neutrality before 2060", which made it more imperative for energy transition. The State Council issued the white paper Energy in China's New Era to provide guidance on China's energy development in the future.

Source: 2020 Report on Oil and Gas Industry Development by CNPC ETRI

Environment and Society

The company is committed to the principle of "people-oriented, quality utmost, safety first, environment prioritized" to achieve "zero defect, zero injury and zero pollution". We pay attention to people's livelihood and social progress, and strive for harmonious relationship between energy and the environment, as well as enterprise and the community.

At CNPC, we put the environmental protection, energy conservation and emission reduction, provision of clean and efficient energy, as well as joint development with the community as an important basis for our sustainability strategy. The company continues to promote safe, green and thrifty operations, press ahead with the construction of ecological civilization and develop a resource-saving and environmentally-friendly enterprise. As a good corporate citizen, we actively support community development where we operate in order to promote local economic and social development.

Safe Operation

We actively promote the building of a long-acting safety system and comprehensively enhance our work safety management. In 2020, the company maintained a safe momentum in production.

Management System and Performance Assessment

In 2020, we issued a range of rules and regulations, including the Measures for Organization-wide Work Safety Scoring Management and the Measures for Work Safety Responsibility Sites, to ensure work safety accountability, facilitate work safety briefing and performance review, strengthen safety performance assessment at all levels and create an organization-wide safety management system with clear tiers and graded responsibility.

Safety Risk Management

The company implemented a dual-prevention mechanism covering risk prevention and control as well as hazard identification and treatment for production safety, and improved the risk prevention and control classification system, so as to eliminate safety risks and potential hazards. In 2020, we continued to implement a hierarchical risk control system in our subsidiaries, take targeted measures and go through change-related safety risks identified in the oil and gas pipeline reform and the split-up of "utilities, heating and property management" services. A safety risk management program for reserves and capacity expansions was developed. In particular, a risk control plan for high-sulfur gas fields in Sichuan and Chongqing was formulated and a special inspection was conducted.

Hazard Control

We attach equal importance to both prevention and control of hazards, build a long-acting mechanism for hazard control, so as to ensure all hazards are timely and effectively treated. In 2020, we launched a 3-year action plan for production safety, setting forth safety restrictions for key areas and processes, well control inspections and hazard control measures for pipelines and gas storages to ensure a fundamental improvement in production safety.

Supply Chain Safety

We include suppliers and contractors into our safety management, and have an all-process management from access, selection, training, use, to evaluation, so as to prevent and reduce accidents caused by suppliers and contractors. In 2020, we examined carefully our strategic contractors, implemented a "zero tolerance" policy against incompetent contractors and provided training for key positions to reduce safety risks in connection with contractor operations on an ongoing basis.

Overseas Security Management

We constantly reinforce the operation of social security management system, strengthen social security risk prevention and control, and enhance emergency response capabilities. In 2020, in response to the COVID-19 pandemic, we introduced a four-tier overseas joint prevention and control mechanism, set up regional coordinating groups covering 78 countries/regions around the world, recording zero COVID-19 deaths and zero social security-related deaths throughout the year.

Environmental Protection

We make great efforts to reduce adverse effects on environment and climate. By improving resource utilization efficiency, fighting the battle against pollution, and promoting energy conservation and emission reduction, we strive to achieve environmentally-friendly and resource-saving operations and vigorously advocate the construction of ecological civilization, in order to achieve harmony between energy and the environment.

Environmental Risk Prevention and Control

We carry out environmental risk identification and assessment, and implement a risk prevention and control management model focusing on forecasting, pre-warning and monitoring. We have established a sound risk management mechanism featuring "tiered management and hierarchic prevention and control", in order to ensure overall control over environmental risks. In 2020, we formulated a set of work plans for upgrading pollution control and environmental protection in the Yellow River regions, identified and treated eco-hazards, strengthened the management for environment incidents and environmental violations, and implemented escalated investigation and treatment for environmental incidents. In 2020, no major environmental incidents were reported.

Sustainable Use of Resources

We attach great importance to the protection and rational utilization of energy and natural resources and strive for conservation of natural resources. Focusing on enhancing water use efficiency for achieving water sustainability, our water conservation activities include planning and management of water use, deployment of water-saving and recycling technologies, integration of water conservation indicators into performance assessment, and minimizing the use of fresh water. Based on the requirements for well-studied site selection, efficient use, sufficient protection and timely remediation, land use efficiency is improved through innovated land-saving practices and management models, optimal and intensive land use in production processes, land reclamation, and restoration of geological environment in mining areas. In 2020, we reduced energy consumption by 0.79 million tons of standard coal, water consumption by 10.33 million cubic meters, and land consumption by 1,190 hectares.

Waste Disposal and Ecological Restoration

Hazardous wastes are strictly monitored and controlled with a lifecycle management system in place to address ecological and environmental risks in key areas. A lifecycle management platform for hazardous wastes is introduced with a three-level management mechanism. Solid wastes such as oily sludge, drill waste and spent catalyst are monitored and controlled in the process of collection, storage, transportation, recycling and disposal. In 2020, we launched an online solid waste management platform to strengthen monitoring of stationary pollution sources and introduced discharge permit management in all our refineries. COD, ammonia nitrogen, sulfur dioxide, and nitrogen oxide emissions were reduced by 4.0%, 4.5%, 7.3%, and 6.4% respectively year-on-year.

In 2020

Energy saved
0.79
mmt of standard coal

Water saved
10.33
million cubic meters

Land saved
1,190
hectares

Conservation of Biodiversity and Natural Habitats

We are committed to minimizing the potential impact of our operations on the ecological environment and biodiversity. A holistic approach to pollution source control and lifecycle management across the value chain is adopted. Pollution and ecological damage issues are investigated and addressed effectively. Noise reduction and emission reduction measures are taken to minimize our footprint in the ecological environment. We withdraw from environmentally sensitive areas in an orderly manner, do our utmost to minimize the use of arable land, and strive for soil and water conservation, vegetation restoration, ecological remediation and protection of biodiversity. In 2020, we closed 281 oil, gas and water wells in environmentally sensitive areas. Our 20,300 service stations were renovated to ensure leak-proof operation.

Protecting the environment to boost green development

We have been actively promoting environmental protection and following eco-friendly practices in the spirit of "lucid waters and lush mountains are invaluable assets" to progress with "Green Mining" continuously.

Dagang Oilfield is located on the coast of the Bohai Sea, where wetlands, water reservoirs, river courses, tidal flats, farmland and other ecological systems coexist. Every year, hundreds of thousands of birds inhabit and visit the Beidagang Wetland, including endangered species such as the Oriental White Stork.

Our eco-friendly practices:

- Ensuring 100% of waste water and waste gas from stationary pollution sources are up to discharge standards and 100% of solid wastes are properly disposed through cleaner production
- Eliminating "mud pool" to prevent land pollution associated with drill mud and fluids
- Avoiding environmentally sensitive areas in source design by shifting from "one-well-one-site" to "multiple-well-one-site"

Climate Change and Low-Carbon Transition

In response to the Paris Agreement adopted at the Paris Climate Conference, the goal to hold global average temperature increase to "well below 2°C above preindustrial levels" and the "carbon peak" and "carbon neutrality" pledges of the Chinese government, we actively take on climate change and push ahead with a green and low-carbon transition, aiming for achieving near zero emissions around 2050.

Natural gas decarbonization & recovery facilities

Green and Low-Carbon Transition

We have integrated "green and low-carbon" into our corporate development strategies and formulated the roadmap in alignment with the "3060" goal. We continue to bolster natural gas supply and promote a "green" growth pattern based on core oil and gas operations and a mix of alternative and renewable energies to create a low-carbon energy ecosystem. In addition, we continue to explore new low-carbon business models, develop new energies and new materials and facilitate emission reduction and de-carbonization in traditional operations. We support the large-scale development of geothermal energy, beef up R&D and application efforts in biomass, make plans for laying out hydrogen business across its value chain and promote the development and use of clean energy according to circumstances.

CNPC roadmap for green and low-carbon development

We attach great importance to the transition to a green and low-carbon development model and formulate the roadmap in alignment with the "3060" goal. We have initially established a three-step strategy, i.e. "clean alternative, strategic replacement and green development", in a bid to achieve carbon peak by 2025 and "near zero" emissions by 2050 through the following three main measures:

- The advantage of natural gas as a green and low-carbon energy is given full play as we vigorously boost gas output and aim to increase the share of natural gas in the our total production to an industry-leading level of approximately 55% by 2025.
- Highlight the essential role of natural gas in the future energy mix, utilize our mineral rights for abundant resources of wind, solar, and geothermal energy and push ahead with the transition to a leading company in broad energy services, i.e. oil, natural gas, geothermal energy, electricity and hydrogen, with integrated development of wind, PV, natural gas and electricity, industrialized application of hydrogen, and scaled development and utilization of geothermal resources.
- Promote the Green Action Plan and bolster efforts in implementing energy-saving, emission-reduction and clean alternative solutions to reduce carbon emissions; use forestry carbon sink and CCUS techniques to facilitate carbon removal; and provide our society with green and zero-carbon energy products.

We play an active role in global oil and gas industry cooperation on climate change by supporting and participating in a number of greenhouse gas reduction and control plans and initiatives:

- The Paris Agreement
- China's National Climate Change Program
- China's National Plan on Climate Change (2014-2020)
- Carbon Technology Strategic Alliance for Carbon Capture, Utilization and Storage (CTSA-CCUS)
- Oil & Gas Climate Initiative (OGCI)
- China Petroleum and Chemical Industry "Carbon Peak" and "Carbon Neutrality" Pledges

Carbon Emission Management

We strengthened management on carbon emission control and improved the control system through business structure optimization, removal of obsolete capacity, recycling of greenhouse gases, monitoring/reporting/verification (MRV) of greenhouse gas emissions etc. The Action Plan for Methane Emission Control was released, setting a target of reducing methane emission intensity by around 50% by 2025 compared with 2019. In 2020, our domestic GHG emissions per unit of oil and gas production decreased by 9.65% compared with 2019, among which the methane emission intensity decreased by 6% from the previous year.

CNPC's Role in OGCI De-carbonization Actions

As the only Chinese member in OGCI, CNPC is deeply involved in international cooperation to address climate change and works with other OGCI members in response to climate change and low-carbon transition of the oil and gas industry. We have prepared a CCUS (Carbon Capture, Utilization, and Storage) Development Plan for the 14th Five-Year Plan period. In 2020, Dai Houliang, chairman of CNPC, signed the Open Letter from the CEOs of OGCI, reiterating continued efforts and pledge to promote carbon emission reduction despite the COVID-19 pandemic and low oil prices. Focusing on sustainable transportation, we hosted a roundtable on reducing transportation emissions and held an online forum on opportunities in sustainable transportation. The research and planning for Xinjiang CCUS Industry Promotion Center was completed and the first-phase plan was reviewed and approved by the expert panel.

Carbon Emission Reduction During Production

We endeavor to optimize the structure of energy consumed by ourselves, reduce carbon emissions and carbon footprint in production processes, minimize the use of fossil fuels, accelerate the shift towards clean alternatives and reduce energy consumption intensity. In Huabei Oilfield, Tarim Oilfield and other areas where conditions are ripe, renewable energies such as geothermal energy and solar energy are used to reduce carbon emissions during production. In 2020, the share of natural gas in our total energy consumption was up 2.14 percentage points from 2015, with the share of raw coal down 2.51 percentage points from 2015.

Market-based Mechanism for Carbon Saving

We actively participate in carbon trading activities to achieve carbon emissions reduction through market-based mechanisms. We are the co-founder of the Tianjin Climate Exchange (TCE), the first comprehensive emissions trading institution in China. The energy saving and emission reduction projects developed by TCE can reduce energy consumption by more than 200,000 tons of standard coal annually, equivalent to over 500,000 tons of carbon dioxide in emission reduction. All CNPC's subsidiary companies engaged in the China's emissions trading system fulfilled their end of bargain in 2020.

Forestry Carbon Sink

We support and partake actively in the construction of carbon sink forest and forestation activities in China. The company established the China Green Carbon Foundation together with the State Forestry Administration for ongoing efforts in that regard. Meanwhile, we set up the Forestation Committee to ensure continuous forestation in our production areas and living quarters. In 2020, we planted 2.811 million trees throughout the year and created the first "carbon neutrality" forest in Maanshan, Daqing oilfield. By the end of the year, our green coverage reached 286.6 million square meters.

Social Responsibility

We maintain a strong commitment to aligning our business growth with local sustainable development by bolstering people's livelihood and social progress, reaching out to community building where we operate in various forms, and sharing development opportunities and resources value with the local communities.

Targeted Poverty Alleviation

We respond actively to the initiatives of the United Nation's 2030 Agenda for Sustainable Development and to the Chinese government's policies on poverty alleviation, with a special focus on people's livelihood, industrial development, intellectual development and medical care. By combining our business strengths with local resources and market advantages in areas receiving assistance, we take targeted measures to help them develop the local economy on their own.

We have been working on our poverty alleviation solutions and playing an active role in winning the battle against poverty. In 2020, we invested RMB 172 million in 84 projects, including infrastructure reconstruction, education and training, healthcare, as well as industrial collaboration, in 13 counties and districts from seven provinces (municipalities and autonomous regions) of China, namely Xinjiang, Tibet, Qinghai, Chongqing, Henan, Jiangxi and Guizhou.

Education

We carry out various activities in helping young people access equal opportunities for education. Specifically, we set up scholarships, offer grants and subsidies to students from underprivileged families, improve teaching conditions for impoverished regions, and support scientific and cultural activities as well as relevant events. In 2020, CNPC Scholarships totaled RMB 3.99 million to 635 students. In addition, we explore new models to support education, and call on the public to pay attention and work together to achieve education equality. In partnership with the China Foundation for Poverty Alleviation, Beijing Normal University Education Group and Tencent Charity Foundation, we are actively involved in commonweal projects such as Xuhang Scholarship Program and the Teacher Training Program to increase access to education in poverty-stricken areas.

Promoting Local Development

We adhere to the principle of open-up and cooperation for mutual benefit, and keep expanding our joint-venture cooperation with local capital in the upstream, midstream and downstream sectors. During the process of developing and running our projects, we help to nurture local suppliers and contractors, thereby creating jobs, driving related business growth, and giving back to local people.

Teacher Training Program helped children in poverty-stricken areas receive better education

Contributions to the Development of Overseas Communities

We respect the cultures and conventions of the host countries, and are committed to establishing long-term and stable cooperative relations in an oil and gas community of shared interests. As a good corporate citizen, we incorporate our development into local socio-economic growth and actively create socio-economic value to jointly promote the development and prosperity of local communities.

Enhancing Communication with Local Communities

We set up environmental protection and community relations coordinating bodies in many overseas areas to promote communication with local governments, NGOs and community representatives, with whom we have strengthened communication and coordination by holding conferences, issuing reports and paying visits.

Managing Community Impact

We exert a positive influence in community development through responsible operations, which is not only reflected in job creation, tax contribution, and business opportunities for local suppliers and service providers, but also in reducing the impact from production and operation activities on community environment and social life to protect rights and interests of community residents. Before launching a project, we conduct assessments of its social and economic impact, taking into consideration of local people's needs, their rights and benefits, cultural heritage, and involuntary resettlement, in a bid to protect the legitimate rights and interests of local people.

Women's Health Volunteer Project

In 2020, we launched the Women's Health Volunteer Project in Rumaila, Iraq, aiming to improve health knowledge among local households, promote early detection of health problems and give medical advice through a range of health and hygiene education activities. The project selected and trained 43 female volunteers to prepare them with professional information on hygiene, health, common symptoms and diagnostic methods to assist the local households as much as possible. Volunteers visited nearly 1,000 households every month and the project benefited more than 4,000 residents in the area.

Our Singaporean arm celebrated the Chinese New Year together with the elderlies in local communities

Participating in Community Welfare

We take an active role to help improve the living conditions of local people to achieve harmonious and mutual development through donating in education, healthcare and other public welfare programs. In 2020, we assisted the countries where we operated in fighting the pandemic by donating COVID-19 supplies, providing necessary assistance in pandemic control services and sharing information on pandemic control practices.

Promoting Localization

We strictly comply with laws and regulations in the countries where we operate, and have made remarkable contributions to local economic development. We place priority on purchasing local products and services, and create opportunities for local contractors, suppliers and service providers to participate in our projects. We also support the development of local SMEs and business start-ups in local communities and create job opportunities. Since our presence in Kazakhstan in 1997, we have invested USD 30.1 billion there in oil and gas development over the past two decades, paid more than USD 48 billion of taxes, and donated approximately USD 400 million to support public welfare.

Targeted actions against poverty

Poverty is a common challenge all countries are facing in the process of achieving sustainable development. No Poverty is the Goal 1 in the United Nation's 2030 Agenda for Sustainable Development. The Chinese government has made it a top priority to end poverty in achieving the goal of building a well-off society in an all-round way. CNPC is deeply committed to poverty alleviation as part of our CSR efforts. We have been seeking the effective way to fight poverty and contribute to global sustainable development.

We have been combining poverty alleviation with cooperation among all sides, livelihood improvement with sustainable development, and economic progress with education access. We have launched a number of poverty alleviation projects, lifted several impoverished groups out of poverty, set up an experienced poverty alleviation team and developed a multi-faceted poverty alleviation model. In line with the local poverty alleviation plans, we bring financial support, capacity building and resources integration together and leverage the advantages of professional institutions, enterprises, and the public to create a poverty alleviation ecosystem. A targeted approach to poverty alleviation has been adopted to ensure the much-needed resources are provided to the right people, the projects are carefully planned and implemented, the funds are properly used, the measures are developed for individual households, the work teams are sent to the participating villages and the desired results are achieved. Since 1988, we have spent approx. RMB 7 billion in poverty alleviation to benefit close to 10 million people from 476 counties/cities) in 28 provinces, municipalities and autonomous regions across the country.

1988-2020 in China:

- Approx. RMB **7 billion** of assistance funds
- Poverty alleviation projects covering **476** counties/cities in 28 provinces, municipalities and autonomous regions
- More than **10,000** poverty alleviation team members working with local communities
- Benefiting a population of approx. **10 million**

Four Areas of Poverty Alleviation

- Livelihood: With a focus on addressing livelihood issues such as low living standard weaknesses in public services and low income, we have implemented herder housing, municipal utilities, infrastructure, drinking water and irrigation projects, aiming to bolster public services and promote the harmony of social and economic progress in the local communities.
- Industry: We endeavor to support local industries and create jobs by identifying resource endowments, exploring market potential, seeking value generation opportunities, and pooling and providing resources based on in-depth research. All this helps facilitate endogenous development in local communities, increases income for the poor and enables sustained poverty alleviation.
- Education: We continue to reduce poverty through education, i.e. promoting equality in education, narrowing education gap, training teachers, building educational infrastructure and providing student grants. Educational support for young people in poverty-stricken areas covers all stages from kindergarten to university. In rural areas, a wide range of well-designed training programs are made available to young and middle-aged people in order to improve cultural and professional competences among the underprivileged people.
- Healthcare: We stress the importance of healthcare progress in poor parts of the country and strive for access to high-quality health services to reduce poverty in relation to or caused by poor health. We help the local communities address the shortage of healthcare facilities and healthcare workers to improve health.

Poverty Alleviation Practices

Water-efficient irrigation projects in poverty-stricken areas

Qinghe County, where several ethnic groups live, is located in the border area of Xinjiang. Due to the harsh natural environment and a weak industrial base, Qinghe has been one of the key counties under the national poverty alleviation program. Given the extended drought and low crop yields in the area, we have invested more than RMB 10 million in water-saving irrigation projects since 2016 to improve the irrigation conditions of more than 8,000 mu of arable land and increase income for the local farmers and herdsmen.

Eco-friendly forestland in Xinjiang

From 2018 to 2020, we have donated RMB 22 million to support the afforestation project in Qapqal County, Xinjiang as part of our poverty alleviation efforts. An integrated "Ecology + Industry + Poverty alleviation" model is adopted for the afforestation project. The project recruits low-incomers as forest rangers to participate in the process of afforestation and forest management and increases income for poor families. The 10,000-mu afforestation project will be open to tourists, aiming to build an eco-sustainable and livable Qapqal and encourage the local poor to participate in the "under-forest economy" to share development dividend of eco-industry. As of 2020, the project has completed afforestation of 10,000 mu, creating jobs for 220 poor households.

E-commerce programs in poor parts of Guizhou

Xishui County in Guizhou Province has been economically underdeveloped due to lack of talents and poor transportation. In recent years, in addition to selling local agricultural products and industrial products through our network of service stations, we have been working with the China Foundation for Poverty Alleviation in offering e-commerce training courses in Xishui County. We also help the local community develop their e-commerce development plan, introduce Alibaba's Rural Taobao initiative, set up Rural Taobao service stations, and establish an e-commerce platform to put the local industries on the fast track of Internet economy.

Tongzhou Health Project for children healthcare

In order to promote well-being of left-behind children from poor families in rural areas, we join efforts with the China Foundation for Poverty Alleviation and Ai You Foundation in launching the Tongzhou Health Project. The project assists poor families in early detection and treatment of childhood diseases and provides relief funds for eligible applicants to reduce financial burdens for these families. Depending on the nature and seriousness of disease, the families will be granted a reduction from their medical expenses of up to RMB 50,000 after review. The project also organizes free clinics for children aged 0-14 from time to time and provides medical assistance to answer questions for parents of young patients, promote prevention and control of diseases and build health awareness.

Human Resources

At CNPC, we actively push ahead with the reform of talent development system and strengthen talent pool building to develop an innovative and motivated workforce and provide an enabling environment for employees' self-realization.

Upholding the people-first concept, we attach great importance to safeguarding employees' legal rights and interests, building an effective platform for employees' career development, and promoting the localization and diversification of our overseas workforce. We pay close attention to the physical and mental health of our staff, care about their life, and ensure that all employees could benefit from the company's development and grow along with the company.

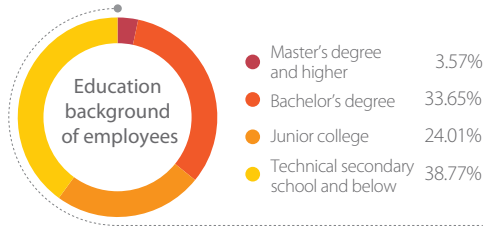
Employees' Rights and Interests

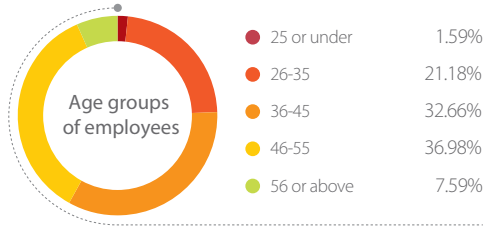
Strictly complying with international conventions on labor and human rights, we respect and safeguard employees' legal rights and interests, and advocate an employment policy focused on equality and non-discrimination. We continue to perfect the compensation and benefits system, and improve workplace democracy, so as to create a fair and harmonious working environment for employees.

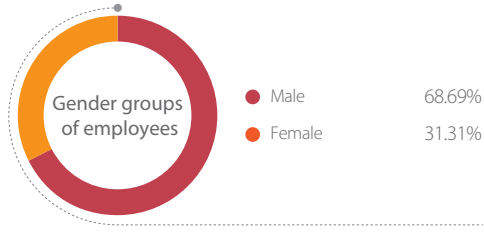
Employment Policies

We always value and safeguard the lawful rights and interests of our employees. We strictly comply with the Labor Law of the People's Republic of China, the Labor Contract Law of the People's Republic of China and the Trade Union Law of the People's Republic of China, relevant international conventions approved by the Chinese Government, and relevant laws and regulations of the host countries. We promote the employment policies of equality and non-discrimination, and provide equal opportunities and fair treatment to all employees regardless of nationality, race, gender, religion or cultural background. We resolutely prohibit child labor and forced labor, and strive to increase the percentage of women and ethnic minorities, and guarantee fair compensation, benefits and career development opportunities for all employees.

In 2020, we participated in the "Boosting Jobs amid the Pandemic" Initiative of state-owned enterprises and increased the number of graduate hires, recruiting 6,492 fresh graduates throughout the year, of which 36.6% were masters or PhDs. As of the end of 2020, 31.31% of the company's employees are female, and 37.22% hold bachelor's degree or higher.







Compensation and Benefits

We intensify our efforts to reform the remuneration and benefits system, improve policies on enterprise annuity and supplementary medical insurance, and further improve the salary distribution system which is more performance-based and profit/efficiency-focused. We have formulated and issued the incentive measures on performance excellence, improved a differentiated approach to salary distribution, pushed ahead with a dividend-sharing system in sci-tech enterprises and promoted the inclusion of various factors in salary distribution. Priorities are given to high-productivity and high-profit subsidiaries, as well as to front-line workers, key position staff and talents with much-needed expertise and skills to make employees feel valued. 100% of our employees are covered by labor contract as well as the Social Insurance Law of the People's Republic of China.

Employee Engagement

The company has a democratic management system and an open bulletin system based on workers' congress in place to encourage employee engagement in company management. We have established multiple channels to communicate with employees for opinions through employee representative meetings. In addition, we guarantee the employees' rights to know, participate, manage, vote and supervise to improve employee engagement constantly.

Career Development Platform

To accommodate the needs for career development of our employees at different stages, we stress the importance of career planning, promote innovation in the environment and mechanism for talent development and bolster the resource pool system to support talent development. All this provides a great platform for employee self-realization.

Education and Training

At CNPC, a "two-tier planning and three-tier training" mechanism is adopted to ensure participation and effectiveness of employee training. We unleash the potential of human resources through "Internet + training" and introduce new training methods to meet the diverse and differentiated needs for training. We strive for positive interaction between employee development and business growth to improve qualities and competences of our employees effectively. In 2020, our spend in employee training totaled RMB 1.45 billion, covering 8,400 training programs and achieving a "full coverage" for employee training across the organization during the pandemic.

We emphasize on the "Four Talent Training Projects". Training of managerial personnel is focused on improving ideological qualities and leadership capabilities; training of technical experts maintains a focus on the latest scientific and technological theories and innovation capabilities; training of skilled operators is aimed at

An innovative and motivated talent development environment enables employees' self-realization

In 2020, we

Beefed up the building of a standard system for on-the-job training

- Launched the first training course design competition and providing a shared platform for employee training
- Started the building of HR cadres qualification training system and the on-the-job training standard system to set out the structure and sequence of the training system

Promoted "Internet + Training"

- Brought online the CNPC e-learning APP, which integrates mobile learning, training management and knowledge management
- Offered 252 online training programs in the form of live streaming, online examination and hybrid virtual/in-person training etc.

The first training course design competition

improving overall competences and professional skills; training for key position staff in international operation is designed to cultivate high-level international talents.

We appraise and recognize model workers, outstanding workers, technical experts and academic leaders, encourage employees to participate in award programs at home and abroad, and commend their success in the forms of financial rewards and social recognition. Job skill competitions are conducted regularly, in combination with on-the-job training, to help achieve skill excellence and motivate front-line employees.

Career Development

We attach great importance to the career planning of employees and support the career development of employees to realize their value. In 2020, we continued to deepen the reform in technical rank-based career development, improve job rotation and incentive mechanism to unleash the potential of employees and create an independent, unimpeded and stable career path for technical staff. We pushed ahead with the talent training initiatives including Oil Scientist Training Program, Petroleum Master Program and Outstanding Young Technician Training Project so as to enable upward mobility for innovative talents.

As of the end of 2020, we have 23 CAS and CAE academicians, 185 senior technical experts and 468 technical experts. In addition, we have set up 112 Skilled Expert Workshops with 380 Skilled Experts, including 28 National Skilled Expert Workshops.

In 2020

We spent RMB 1.45 billion in employee training, covering 8,400 training projects with a total training time of 21 million hours

In-person training: 693,000 person-times; online training: 16,626,000 person-times

100% of front-line employees received necessary training

100% of senior technicians and operators in key positions received advanced training

Localization and Diversity

At CNPC, we embrace a culture of respect, openness and inclusiveness and take a profession-based and market-driven approach to local employment. We continue to improve our HR procedures for recruitment, employment, performance review and reward/punishment under the applicable laws and regulations of the host country. Meanwhile, we attract and retain top talent from the local community by providing them with a career development platform.

Local Employment

We bring job opportunities, employ and train local people, and promote local employees to management positions. Our overseas operations are hiring professional talent in E&P, engineering and construction, international trade, finance, accounting and human resources management in more than 80 countries and regions. As of the end of 2020, we had an overseas workforce of 120,000 employees, including 105,000 local hires and international employees, with a localization rate of 88%. In particular, local employees accounted for 95% of CNPC-invested projects.

Respecting Cultural Diversity

We give full accommodation to the personality, ability and background of employees, and cherish their varied talents. We make every effort to eliminate the employment and occupational discrimination, create a relaxing and inclusive working environment, and promote the mutual respect and understanding among employees from different ethnic groups, nationalities and cultural backgrounds.

Training on cultural diversity management at Abu Dhabi project

The Abu Dhabi project is one big family with employees from Asia, Europe, Americas and Africa. A cultural diversity management training program is implemented to promote understanding among employees from diverse ethnic, cultural or religious backgrounds and address cultural collisions in workplace.

World's top experts are invited to work with leading teams in cross-cultural communication training in designing and deploying a training course on "managing cultural diversity and building a learning organization in a multinational company". The training course comprises "preparation of questionnaires on trainee information" + "short sessions on key topics" + "one-on-one competency assessment" + "assessment report analysis and improvement" etc., aiming to find out how well managers perform in a multi-cultural working environment, give suggestions for improvement in the form of one-on-one review to boost performance. The training course is well received by all participants.

Employee Health

We give top priority to employees' life and health. We have rolled out a series of policies and measures to provide a favorable working environment for the physical and psychological health of our employees and ensure that they can work in good physical conditions with positive attitudes.

Occupational Health

As part of our ongoing efforts to improve occupational health of our employees, we launched a health risk assessment project, an occupational health survey and a publicity campaign on the Occupational Disease Prevention and Control Law in 2020. We released the implementation plan for the Healthy China 2030 Initiative, pinpointing 12 key tasks and 38 activities and setting forth requirements for mental health, dietary health and pandemic control based on the company's business portfolio and experience on COVID-19 control. In 2020, 99.23% of our employees received occupational physical examinations and the screening rate of occupational hazard factors stood at 99.39%.

Mental Health

We take measures to continuously improve the employee recuperation and vacation system. We implement the Employee Assistance Program (EAP), set up hotlines and website for psychological consultation, and carry out various forms of training on mental health improvement of employees. In 2020, given a new normal with COVID-19, we organized a team of experts to address employee mental health issues and provided counseling services through help-lines for overseas employees. The counseling services under EAP provided a trusted and effective way to seek and receive psychological assistance and ensure the mental health of overseas employees and their families.

Fighting COVID-19 for the health and safety of overseas employees

In the face of the raging COVID-19 pandemic, we have established a comprehensive system to safeguard employee wellbeing in our overseas operations by identifying the need for COVID-19 supplies, creating an online medical assistance platform, offering online lectures on pandemic control and providing overseas medical teams with access to the resources at domestic healthcare institutions.

As of the end of 2020, we reported zero COVID-19 cluster case and zero COVID-19 related employee death in overseas operations.

Technology and Innovation

In light of its business development program, the company has deepened R&D reforms and stepped up talent development in a bid to foster innovation on all fronts and create a new engine for growth.

Technological innovation is the key driver for our high-quality growth on the way to build a world-leading integrated international energy company. In 2020, in line with the principle of "Support current business and lead future development", we continued to unleash the power of innovation by increasing R&D spending, optimizing allocation of R&D resources, beefing up R&D efforts on core technologies and deepening integration of digital technology into the oil and gas value chain. A number of technological advances were achieved in "stuck-point" areas, applied fundamental research, and advanced technology reserve.

Construction of Technological Innovation System

We continue to push ahead with the construction of our technological innovation system featuring multi-tier and multi-direction, to support the growth of our business units. With on-going investment, improved management and stronger team building, our technological supporting system becomes fledged gradually.

In 2020, we continued to optimize the institutional framework for innovation governance to bolster the strategic role of R&D in business growth. We emphasized the leading role of expert committee in decision-making and approval procedures, set up cross-sectoral, cross-disciplinary R&D teams and pushed ahead with the deployment of overseas R&D centers, and kept improving conditions and platforms for conducting R&D work.

Project-based Management was widely adopted. Expert positions were identified and appointed for key R&D projects; a category-based evaluation system was introduced; dividend incentives were piloted at some R&D projects. The management reform for core R&D projects advanced steadily; project managers were selected openly company-wide; the most competent team leaders were appointed to be in charge of the R&D efforts for "stuck-point" technologies.

The construction of a number of R&D platforms was completed, including the National Energy R&D Center (Laboratory) for Long-distance Pipeline Technology & Equipment, National Energy R&D Center for LNG Technology, National Engineering Laboratory for Oil & Gas Pipeline Transportation Safety, CNPC Key Laboratory of Heavy Oil Processing, CNPC Key Laboratory of Oil and Gas Business Chain Optimization, and CNPC Key Laboratory of Market Simulation and Price Forecasting.

As of the end of 2020, we had 84 research institutes, 54 key laboratories and testing centers, and 21 national R&D platforms covering upstream, midstream and downstream activities. We had 30,013 scientists and researchers, including 23 academicians of CAS and CAE, 185 senior technical experts and 468 technical experts.

Research institutes

84

Key laboratories and testing centers

54

Top 10 technological advances in 2020

- Innovations in risk exploration and evaluation technologies led to strategic breakthroughs in oil and gas discoveries
- Large-area high-abundance shale gas enrichment theory guided the building up of a trillion-cubic-meter-reserve gas province in southern Sichuan
- Nano oil displacement technology helped unlock potential, reduce costs and stabilize production in mature oilfields with low/ultra-low permeability
- The eSeis nodal land seismic acquisition system reached the world-leading level and realized industrialization
- Successful development of 3D induction imaging logging tool led to breakthroughs in anisotropic reservoir evaluation
- Automatic cementing technology and equipment improved operating quality and efficiency
- 3D big-platform horizontal well drilling facilitated the scale development of shale oil
- Automated construction and digital pipeline technology supported the construction of the East-Route of Russia-China Gas Pipeline
- R&D and industrial application of aviation biofuel production technology
- World's first diesel adsorption and separation technology and equipment put into industrial application

Improve quality and efficiency through technological innovation

The company has given a massive boost to technological innovation, commercialization and deployment. In 2020, a total of 60 new techniques were rolled out in E&P, geophysical prospecting, well logging, well drilling and completion, oil production and reservoir stimulation etc.; new techniques and new products were widely deployed and licensing of catalyst solutions was implemented in the refining and chemicals sector.

Major R&D Achievements

In 2020, targeting technological frontiers and bottlenecks, we launched a number of R&D projects to explore solutions for "stuck-point" issues, key technologies, key field tests and fundamental research areas and reached major technological milestones in E&P, engineering & equipment, shale gas, tight oil (shale oil) and new energies etc.

E&P: R&D efforts were focused on enhancing efficiency and profitability. New understandings were obtained on shale oil reservoir forming theories and ultra-deep oil and gas reservoir forming theories. New advances were made in developing EOR techniques for ultra-low permeability reservoirs, new polymers and numerical simulation software etc. These achievements supported exploration breakthroughs and discoveries in the Tarim, Junggar, Ordos, and Sichuan basins to ensure growth in oil and gas outputs.

Refining and Chemicals: The transformation and upgrading in refining and chemicals sector picked up pace; R&D efforts for value-added products were beefed up; Big Refining/Big Ethylene technologies were developed and applied; refineries saw a shift in production from fuels to chemicals; raw materials were becoming low-cost and diversified while refined products were more targeted to high-end and specialized applications. A 400kt/a adsorption and separation unit for diesel was designed and completed.

Oilfield Services: Our service capabilities were bolstered with new breakthroughs in high-end equipment, tools, software and materials, including the GeoEast system, 3D induction logging tool, 7000HP electric fracturing skid and high-performance dissolvable bridge plug etc. We pressed ahead with technological upgrading and further improved efficiency-enhancing solutions for key reserves and production areas.

Frontier Technology: R&D efforts were focused on exploration, cost-efficient development, clean fuels production and high-end equipment manufacturing. Significant progress was made in applied fundamental research, generic/core technologies and advanced technology reserve study. Remarkable results were achieved in E&P, refining and chemicals, oilfield services, natural gas, new materials, energy conservation and environmental protection.

New Energy/New Business Areas: R&D plans were made to promote new energies/new business areas such as geothermal, hydrogen energy, biomass energy, underground coal gasification; R&D efforts in CO_2 flooding, carbon capture and storage were beefed up; significant progress was achieved in related industrial tests to facilitate green development.

Digital Transformation and Intelligent Operation

The company has been actively promoting digital transformation and intelligent operation and used digital technologies such as cloud computing, Internet of Things, 5G, big data and artificial intelligence to facilitate business restructuring, management mode reform and business model innovation, improve core competences, promote business transition and create value.

In 2020, Kunlun Digital Technology Company was set up to create an open, knowledge sharing and innovation ecosystem supporting digital-intelligence transformation, and bolster our services capabilities in the process of digital industrialization and industrial digitalization. "Dream Cloud", the first independently developed shared cloud platform in China's oil industry, has been upgraded and deployed to enable important changes in upstream decision-making, productivity improvement and cost reduction, reserves and production growth, efficiency enhancement and shift on production organization model. Information technology has been further integrated into business operation to build smart oil/gas fields, intelligent refineries, smart marketing and intelligent engineering.

Technological Cooperation

We continue to deepen strategic partnership and carry out technological exchange and cooperation with IOCs, NOCs, international academic bodies, industrial organizations and research institutes from home and abroad to jointly promote theoretical innovation and technological advance in the oil industry and facilitate the "going out" of CNPC technologies.

In 2020, CNPC and Saudi Aramco launched a range of technical exchanges in key areas such as refining techniques, molecule management and smart refinery and reached consensus on a number of issues. Despite COVID-19 impact, we held video conferences and webinars with international peers, including Total, Equinor, Rosneft, and Gazprom to promote the two-way flow and openness of technical resources, facilitate exchanges and cooperation in EOR, produced fluid treatment and recycling, coalbed methane E&P and catalytic cracking catalysts.

We have been partnering with domestic research institutes and universities to carry out technical research and personnel training in the field of oil and gas. In 2020, CNPC and Southwest Petroleum University set up an "innovation combo", a platform for further consolidating production, academy, research and commercialization resources, tackling bottlenecks in E&P activities and providing theoretical and technical support in meeting the needs of key E&P areas. We also made headway in strategic cooperation with the Chinese Academy of Sciences and China University of Petroleum, with a focus on frontier E&P technologies, new materials and new energies etc.

S&T Awards and Intellectual Property Rights

The company's review system for S&T awards is fully aligned with the national review system. In 2020, the 4Mt/a Indirect Coal Liquefaction Technological Package and its Commercialization received the First Prize of the State Science and Technology Progress Award. We also received two second prizes of the State Science and Technology Progress Award and one second prize of the State Technological Invention Award. At CNPC, we stress the importance of the protection and enforcement of intellectual property rights. In 2020, the company filed 6,814 patent applications (including 4,664 patents for inventions) and was granted 5,290 patents (including 1,577 patents for inventions). An open platform for R&D resources has been in place to promote sharing of research results, laboratory data and facilities.

The company continues to build up its standardization system and participate in the standard-setting activities in frontier technologies and areas where we enjoy strength. In 2020, we led the formulation of one international standard, i.e. Natural gas - Upstream area - Determination of Composition by Laser Raman Spectroscopy, and participated in the revision of six international standards. We were granted the organizer prize of the China Standard Innovation Contribution Award and four project prizes jointly granted by State Administration for Market Regulation and Standardization Administration. In addition, we have been playing an active role in forming the Group Standardization Committee of the China Petroleum Society to work with industrial peers in promoting progress in group standardization for the oil and gas industry.

Patents applied

6,814

Patents granted

5,290

Drive high-quality growth through digital transformation

The digital economy is opening up an era of significant transition. Deep integration of information technology into industrial technology is reshaping our production organization and operation mode, leading to industrial revolution and transformation with mushrooming new industries, new business forms and new models. At CNPC, we underscore digital transformation as a strategic step to modernize our corporate governance system and capabilities by promoting integration of Internet, big data and artificial intelligence into oil and gas operations, in a bid to foster new growth, create new momentum and drive high-quality development.

Over the past two decades, we have created and applied 80 IT integrated systems covering production management, operation management, general management, infrastructure components and network security, marking two milestones in the company's IT capabilities, i.e. from distributed to centralized, and from centralized to integrated.

Routing inspection by drones at Changqing

Digital Transformation Goals

Digital CNPC will be achieved by the end of the 14th Five-Year Plan period by leveraging real-time operational data acquisition based on automated sensing, access to internal and external data based on full connectivity, and optimization of execution and operation efficiency based on digital technology. A closed-loop system integrating the physical form of CNPC with its digital twin will be developed to promote two-way connectivity between the tangible business operations and the digital world. A mechanism for linking internal and external activities, information sharing and collaboration will be created to facilitate cost reduction, efficiency improvement, collaboration and sharing, ongoing innovation, risk mitigation and smart decision-making and enable continuous improvement in per-capita productivity and asset profitability.

Digital Transformation Trends

Digital technology will be integrated into products, services and processes of the oil and gas value chain to drive changes in the company's development concept, working pattern, operation management, R&D and institutional framework etc. and build new capabilities in smart production, network-based collaboration and individualized services, in a bid to usher in new business models, production forms and industrial ecosystems driven by users, data and innovation.

Digital Transformation Framework

Based on a value-oriented, strategy-led, innovation-driven and platform-supported principle, the company's digital transformation plan will be focused on business development, management change and technology empowerment. An industrial internet system and an applied ecosystem centered on cloud computing will be established, in a bid to create a "Two-in-One" strategic digital transformation framework.

Further integration of information technology into business operation

	Aim	Application
Smart oil and gas field	Based on perception, interconnection and data fusion, achieving a new oilfield business model of "Real-time Monitoring, Smart Diagnosis, Automatic Handling and Smart Optimization" in the production process.	All-encompassing information systems, including an IoT-based production system and the Collaborative Research Environment, were launched at Xinjiang Oilfield to monitor real-time production dynamics and facilitate business activities. Intelligent analysis was promoted in the decision-making process.
Intelligent refinery	Improving the ability of perception, analysis and optimization, prediction and coordination of refineries to build a new smart refining model featuring efficient supply chain, lean operation, safe work control and interconnected operation and maintenance.	An information system covering management, production execution and operating control was in place at Changqing Petrochemical to enable automated operation, lean management and coordination in production, equipment, HSE and other business areas.
Smart marketing	Based on IoTs, big data, and artificial intelligence, building the digital system of people, vehicles and life, and achieving the goal of "smart marketing, digital operations and integrated management".	Shanghai Marketing is trying to create a digital ecosystem and realized targeted retailing with technologies such as big data and artificial intelligence.
Intelligent engineering	- Building an intelligent support platform for drilling engineering lifecycle to improve risk control, operating quality and efficiency - Implementing intelligent wellbore techniques to enable real-time, visualized and remote surface/downhole monitoring in the process of drilling and completion - Building smart operation sites, including smart drilling and digital seismic crews	Leveraging CNPC's engineering intelligent support system, the digital transformation and intelligent development of our engineering services has shown positive results. As of the end of 2020, the data platform had covered 1,124 wells and solved 4,300 on-site problems remotely, with a 47.93% speed boost in complex troubleshooting.

Annual Business Review

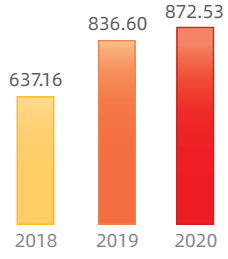
Focusing on market orientation and economic returns, the company continues to optimize production organization and resource allocation, promote integrated and coordinated operation on oil and gas production, refining, marketing and trade activities, improve international operation performance and bolster market competitiveness in supporting business.

Exploration and Production

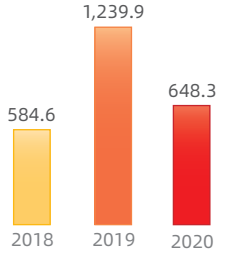
We made significant progress in domestic E&P as a result of our corporate reform and technological innovation, well-planned and enhanced E&P activities, unconventional resources development, and active engagement in foreign cooperation in China.

Exploration

In 2020, sticking to the resource strategy, we optimized resource allocation and investment portfolio, stepped up risk exploration and preliminary prospecting, strengthened overall exploration, precise exploration and high-efficiency evaluation in key basins/areas, and reinforced shale oil/gas exploration. We achieved five key strategic breakthroughs and 15 major discoveries, including eighteen 100-million-ton or 100-bcm proved plays, registering a record high growth in oil and gas reserves. Domestically, newly proven oil in place totaled 872.53 million tons and newly proven gas in place stood at 648.3 billion cubic meters.



Newly proven oil in place (Domestic)
(mmt)



Newly proven gas in place (Domestic)
(bcm)

Reserves and operating data (Domestic)

	2018	2019	2020
Newly proven oil in place (mmt)	637.16	836.60	872.53
Newly proven gas in place (bcm)	584.6	1,239.9	648.3
2D seismic (kilometers)	18,182	11,478	7,852
3D seismic (square kilometers)	12,570	15,204	15,815
Exploration wells	1,803	1,405	1,658
Preliminary prospecting wells	997	733	882
Appraisal wells	806	672	776

Major discoveries and achievements in 2020

A number of important achievements in oil and gas exploration were made to provide a solid resource base for production growth.

Oil

High-yield oil flows were obtained at exploratory wells in the Fukang Sag of the Junggar Basin, the northern Tarim Basin, the Ganchaigou area of the Qaidam Basin, and the Linhe Depression of the Hetao Basin.

Natural gas

High-yield gas flows were obtained at exploratory wells in the central and western parts of the Sichuan Basin and the Bozi area of the Tarim Basin, identifying a number of enriched and prolific zones.

Shale oil

High-yield oil flows were obtained at exploratory wells in the Mahu area of the Junggar Basin, the Gulong Sag of the Songliao Basin, and the Qikou Sag of the Bohai Bay Basin as remarkable progress was made in geological theories and exploration techniques for shale oil.

Oil and Gas Production

The year 2020 saw significant advances in stabilizing oil production and boosting gas output under the Seven-year E&P Action Plan, marking an important year in the company's domestic upstream activities. Domestically, we produced 206.32 million tons of oil equivalent throughout the year, exceeding 200 million tons for the first time in our history; crude production rose for the second year in a row to 102.25 million tons; natural gas output hit a new high at 130.6 billion cubic meters (more than 100 million tons of oil equivalent). The gas to oil ratio was further optimized as the proportion of natural gas in our domestic oil and gas production stood above 50% for the first time.

Development of Key Oil and Gas Fields

Major breakthroughs were made in the development of our domestic oil and gas fields in 2020. The giant Changqing Oilfield boasted an annual production capacity of 60 million tons of oil equivalent. Daqing Oilfield maintained its crude production at over 30 million tons for six years in a row and remained the largest crude oil producer in China. Tarim Oilfield strived to go beyond the limits of ultra-deep E&P activities and produced more than 30 million tons of oil equivalent. Southwest Oilfield made headway in shale gas developments and boosted its annual capacity to 30 billion cubic meters. Xinjiang Oilfield took ramp-up measures targeting at the conglomerate reservoirs in the Mahu region, resulting in steady production increase. Liaohe Oilfield rolled out EOR techniques such as steam flooding, fire flooding and polymer-surfactant flooding to stabilize production above 10 million tons.

Domestic oil and gas production

206.32

million tons of oil equivalent

Domestic crude production

102.25

million tons

Domestic natural gas production

130.6

billion cubic meters

Full-year output of Changqing Oilfield exceeding 60 million tons of oil equivalent

Changqing Oilfield was put into development in 1970. The Ordos Basin, where the oilfield is located, is blessed with rich hydrocarbon resources but features complex geological conditions, poor resource endowments, predominance of unconventional resources, and reservoirs with low permeability, low pressure and low abundance.

The annual output of Changqing stayed at 1 million ton level until the end of the 20th century. In the new millennium, this mature oilfield has revived with the fastest increase both in reserves and production in China, thanks to theoretical and technological innovations. In the past 20 years, the oilfield's annual output increased from over 6 million tons in 2000 to more than 60 million tons in 2020 marking a miracle of efficient development of unconventional oil and gas fields in China.

Innovation-driven high quality development. At Changqing Oilfield, technological innovation is considered as the primary driving force for business growth. By deepening understandings on reservoir geology, overcoming technical bottlenecks, sharpening engineering tools and developing process facilities, we have formed five innovative reservoir-forming theories and four series of innovative technical solutions for the world-class challenge in tapping low-permeability reservoirs. Ten high-efficiency development models have proved successful in Ansai, Xifeng, Sulige and other blocks. All this has enabled the oilfield to remain profitable and achieve sustained, rapid growth in oil and gas production.

Impressive progress in building smart oil and gas fields. Launching the initiative of building smart oil and gas fields in 2014, Changqing is the first oilfield in China to use drones for inspecting oil and gas assets. Through the integration of information technology into industrial systems, digital management has been deployed in all E&P, gathering and transportation, and supporting processes, resulting in much improved efficiency and productivity. So far, the digitalization rate in Changqing reached 96.7% for oil fields and 100% for gas fields, indicating a revolutionary shift of production organization. Since 2007, Changqing's annual output has increased from over 20 million to more than 60 million tons of oil equivalent and the number of oil/water/gas wells has rose from 23,600 to 89,000. Meanwhile, the total number of employees has remained around 70,000. Changqing Oilfield has nearly doubled its labor productivity during the 13th Five-Year Plan period.

Securing supply to the domestic market. Over the past five decades, Changqing Oilfield's proven oil and gas in place have amounted to 5.9 billion tons and 4 trillion cubic meters respectively, accounting for 20% of China's total. Annual increment to proven oil in place has stood above 300 million tons for 10 consecutive years and annual addition to proven gas in place has stood above 200 billion cubic meters for 14 consecutive years. A total of 35 oil fields and 13 gas fields have been successfully developed at Changqing, producing a total of more than 760 million tons of oil equivalent. As China's largest gas province, Changqing has provided more than 450 billion cubic meters of natural gas to over 50 medium to large cities across the country and helped reduce carbon emissions by more than 1.5 billion tons, playing an important role in improving China's energy consumption mix, keeping the sky blue and fighting the battle against pollution.

Acting on Green Development. In line with the concept of green development, Changqing has actively engaged in protecting the ecological environment along the Yellow River. Over the past three years, Changqing has saved land uses by over 17,300 mu and created five eco-demonstration areas in the Longdong oil play. In addition, it has planted more than 7,500 mu of carbon sink forests and added 3 million square meters of green land every year in its operating area, with a green coverage ratio up to 95%.

Annual output breakthroughs (oil equivalent)

2000	2003	2007	2011	2012	2020
6 million tons	10 million tons	20 million tons	40 million tons	45 million tons	60 million tons

becoming China's **largest** oilfield

Stabilizing Production of Mature Fields

Focusing on mitigating decline rate and enhancing recovery efficiency, we have been striving for stable output in mature fields by implementing targeted measures and deploying new development modes. In 2020, the natural decline rate, composite decline rate and the growth of water cut were reduced in our oil fields and the natural decline rate and composite decline rate for gas fields remained roughly flat at a historically good level. Remarkable results were achieved in major pilot production tests, seeing much improved recovery efficiency in high-water-cut, high-recovery-percentage reservoirs, low-permeability and low-abundance reservoirs, and unconventional oil reservoirs.

Building up production capacity

Effectiveness is regarded as the focus for building up production capacity. Single well output was increased through technological progress, and capacity building efficiency was facilitated by management innovation. The year 2020 saw an addition of 12.86 million tons to our crude production capacity and an addition of 28.9 billion cubic meters to our natural gas production capacity. In nine demonstration projects, new capacity building models were developed for shale oil, tight oil, ultra-low permeability and carbonate reservoirs. In the Longdong National Shale Oil Demonstration Area at Changqing, a 1Mt/a capacity-building project was substantially completed, heralding the start of large-scale development at the 1-billion-ton Qingcheng oilfield. Several key capacity building projects at Tarim picked up pace.

E&P Technological Innovations

We maintained a focus on innovative E&P technologies to boost productivity at our oil and gas fields. Technological advances in drilling and completion of deep wells and horizontal wells resulted in significant improvement in speed and efficiency. Low-cost fracturing continued to evolve to boost production greatly. Stable production was supported by EOR techniques such as finely-controlled water flooding, chemical compound flooding and composite thermal recovery etc. Our transition to digital oilfield is paying off as 12 oil and gas fields, including Changqing, Southwest, Tarim and Dagang, see digital technologies fully integrated into production and operation.

Underground Gas Storages

We continued to tap the potential of operating storages and boosted their gas delivering capacity. Meanwhile, new storages were built for the company to be better positioned in the domestic gas market and increase the peak shaving capacity. In 2020, CNPC Underground Gas Storage Evaluation Center was set up to facilitate the development of packaged evaluation technical systems suitable for China's complex geological conditions, so as to ensure gas storages are built under technical guidelines and operated safely and reliably. By the end of the year, we have 12 underground gas storages in operation, with a total peak shaving capacity of 12.4 billion cubic meters.

Unconventional Hydrocarbon and New Energies

E&P efforts in unconventional hydrocarbon such as tight oil, shale oil, tight gas, shale gas and CBM continued to make headway. Meanwhile, we are seeking to explore and utilize new energies such as geothermal, hydrogen energy, and gas hydrate.

E&P of Unconventional Hydrocarbon

In 2020, we stepped up unconventional E&P by enhancing the prediction and evaluation of sweet spots, pilot development and demonstration of profit-based capacity building, enabling large-scale development of unconventional resources.

Tight oil (shale oil): The 1Mt/a shale oil demonstration project was substantially completed at Longdong, Changqing Oilfield; a tight oil capacity-building demonstration area and a nitrogen flooding pilot test area were under construction at Daqing Oilfield. Large-scale light shale oil was discovered in the Gulong Sag of the Songliao Basin. Xinjiang Jimsar, Dagang Cangdong, Tuha and Jilin and other oil fields saw major increases in shale oil reserves and production capacity. In 2020, we produced 1.86 million tons of shale oil.

Tight gas: Changqing, as the largest tight gas producer in China, continued to expand the test scope and develop a model for tight gas development. A high-quality and high-profitability tight gas demonstration area was taking shape. In 2020, Changqing Oilfield's tight gas output reached 33.21 billion cubic meters, accounting for about 18% of the country's natural gas production. In addition, exploration and production of tight gas picked up pace at Southwest, Jilin and other oilfields.

Shale gas: Shale gas development accelerated in the Sichuan basin. More than 20 technical guidelines were formulated for development operations in southern Sichuan to create an organization and management model. Large-scale and profitable shale gas development was achieved at a burial depth of up to 3,500 meters; major breakthroughs were made in deep shale gas exploration. In 2020, the company's first domestic 10 bcm shale gas field was completed in southern Sichuan. The field produced 11.62 billion cubic meters of shale gas throughout the year, up by 3.59 billion cubic meters from a year earlier, making it an important contributor to the company's natural gas production growth.

CBM: Focusing on exploration of the medium-to-high-rank CBM in Shanxi Province, secondary evaluation was conducted in the Qinshui basin and Edong gas field, with new exploration breakthroughs. Capacity-building projects in Fanzhuang, Zhengzhuang and other blocks and upgrading projects for some low-output and low-profitability blocks made headway, adding 380 million cubic meters to production capacity throughout the year.

New Energies

We have been pushing ahead with our new energy development plans and deploying a range of new energy projects closely related to our core operations. In 2020, a leading group of new energy and material development was set up to oversee the strategy and planning for new energy development. New energy operations such as geothermal energy, solar energy, biofuels, and charging (battery swap) stations picked up pace. Particuliarly, major progress was made in our hydrogen energy business.

Hydrogen energy: CNPC, as hydrogen supplier to the city of Beijing and the Winter Olympics, built hydrogen refueling stations at the Capital International Airport, Beijing-Zhangjiakou Expressway and Winter Olympics 2022 hydrogen car parking lots and planned a number of hydrogen expressway "corridors". We worked with business partners such as Shenergy (Group) Co., Ltd., Shanghai Lingang Investment & Construction Co., Ltd. and Foton Motor Co., Ltd. to push ahead with the building of multi-purpose refueling stations with hydrogen and demonstrative hydrogen stations.

Joint E&P in China

We have been deepening the cooperation in China with international partners including Shell, Total and Chevron around low-permeability reservoirs, heavy oil, shallow-water reservoirs, sour gas, high-temperature and high-pressure gas reservoirs, CBM and tight gas.

In 2020, CNPC's foreign cooperation E&P projects in China yielded a record high of 11.74 million tons of oil equivalent, maintaining growth and including 2.95 million tons of crude oil and 11 billion cubic meters of natural gas. As of the end of 2020, the company has 29 joint E&P projects in operation.

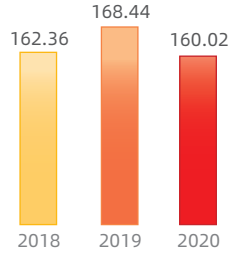
These partnerships continued to make steady headway. The surface facilities of Kashgar North Project at Tarim Oilfield became operational as planned in July 2020; the Nine-1 to Nine-5 blocks in the Junggar Basin in Xinjiang proceeded smoothly; a supplementary extension agreement for the Daan Project in Jilin was signed. The Zhaodong Project at Dagang Oilfield produced oil from new wells profitably, as seven of the nine oil wells becoming operational in 2020 yielded more than 100 tons of crude in the initial stage. The Sulige South Project set foot in a new stage, registering an annual output of 3 billion cubic meters. The Changbei Phase-II and Chuandongbei projects effectively improved production efficiency, as development plans were optimized, fine management was strengthened, and new techniques were introduced.

A CNPC hydrogen refueling station

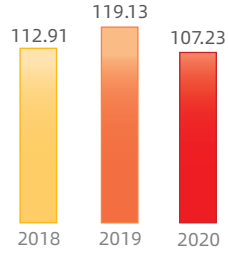
Refining and Chemicals

In 2020, China's refining capacity surged with domestic oil and gas reform. However, the COVID-19 pandemic led to a fall in market demand for refined products, and the refining and chemicals sector was faced with unprecedented difficulties. In response to the market, we reduced crude runs, increased output of chemicals and optimized product portfolio to facilitate high-quality development. We also made further progress in transformation and upgrading of the sector.

Persisting in a marketed-oriented and profit-driven approach, we continued to optimize resource allocation, refining and chemicals production and sales, and increase utilization of our integrated refining & chemical complexes and high-performing refining facilities. In 2020, the company's crude runs stood at 160.02 million tons, refined products output was 107.23 million tons and ethylene production reached 6.35 million tons.



Crude runs (Domestic)
(mmt)



Refined products output (Domestic)
(mmt)

Construction and Operation of Large Refining & Petrochemical Bases

In 2020, we continued to optimize refining operation to ensure long-term stable production. By doing so, 99.69% of the facilities maintained smooth operation. As of the end of 2020, the company has seven large integrated refining-petrochemical complexes and six 10Mt/a fuel refineries in China.

Refining and chemicals operating data (Domestic)

	2018	2019	2020
Crude runs (mmt)	162.36	168.44	160.02
Utilization rate of refining units (%)	81.3	84.1	82.3
Refined products output (mmt)	112.91	119.13	107.23
Gasoline	45.90	50.44	46.28
Kerosene	12.54	14.02	10.23
Diesel	54.46	54.68	50.72
Lub oil output (mmt)	1.60	1.63	1.58
Ethylene output (mmt)	5.57	5.86	6.35
Synthetic resin output (mmt)	9.17	9.58	10.29
Synthetic fiber output (mmt)	0.05	0.04	0.03
Synthetic rubber output (mmt)	0.87	0.91	1.00
Urea output (mmt)	0.83	1.21	2.16
Synthetic ammonia output (mmt)	1.05	1.32	1.86

A number of key projects made significant progress in accelerating the transformation and upgrading of refining and chemical operations. A restructuring and upgrading project became operational at Daqing Petrochemical, capable of producing 10 million tons of refined products and 1 million tons of ethylene per year. The core unit of Daqing Refining & Petrochemical's paraffin expansion project successfully commenced operation, to greatly enhance its deep processing capabilities. Lanzhou Petrochemical's capacity for jet fuels and chemical raw materials was bolstered, as its 240 Kt/a ethylene capacity restoring project, 900 Kt/a diesel hydrogenation upgrading project and the Changting catalyst project in Fujian became operational. At Guangdong Petrochemical, the all-plant digitalization project was launched. The ethane-to-ethylene projects at Changqing and Tarim moved forward steadily.

Optimization of Product Portfolio

We stayed with our decision to reduce refined products production while increase output of chemicals, maintained flexibility in adjusting the diesel-gasoline ratio and produced more jet fuels, aromatics, high-grade gasoline fuels, lubricants, and low-sulfur marine fuels based on market demand and economic benefits. In 2020, 16 of the 28 key technical and economic indicators for our refineries were better than a year earlier, with the refining comprehensive commodity rate increasing by 0.04 percentage points year-on-year.

We engaged in R&D and production of low-sulfur marine fuels in response to the sulfur limit taken by the International Maritime Organization (IMO). Jinxi Petrochemical, Jinzhou Petrochemical, Changqing Petrochemical and other refineries started to deliver low-sulfur marine fuels. As of the end of 2020, we have expanded our capacity for low-sulfur marine fuels and blending components to 4 million tons per year, opening up a new value-added market.

In view of the shortage of medical supplies at the onset of the COVID-19 outbreak, production plans were refocused on ethanol, sodium hypochlorite, ethylene oxide and other disinfection products. Production lines for face masks and meltblown fabric were installed at many refineries to complete the industrial chain for mask production. We produced more than 800 tons of meltblown fabric and 146 million face masks throughout the year.

Production growth in synthetic resin, synthetic rubber and PX was remarkable with continuous R&D advancement. New chemical products under 87 brands were developed throughout the year. New product lines took shape, including Dushanzi Petrochemical's polyethylene for blow molding applications and Lanzhou Petrochemical's high-melt-strength and impact-resistant polypropylene. Continuous production of ultra-high molecular weight polyethylene (UHMW) and a breakthrough in metallocene catalysts for polyolefin production were achieved at Liaoyang Petrochemical.

A refining restructuring project went on stream at Daqing Petrochemical

Launched in July 2018, the project was designed to boost outputs of refined products, improve product quality, optimize product portfolio and facilitate the shift to value-added processing of crude oil by leveraging existing facilities and upgrading primary and secondary processing units.

The successful commissioning of the project made Daqing Petrochemical one of China's 10Mt/a refineries, increasing its processing capacity from 6.5 million tons to 10 million tons per year. The project produced National VI-B gasoline fuels, helped reduce the diesel-gasoline ratio to 0.74 and added 1.2 million tons to the raw material output.

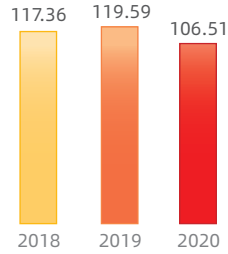
Kunlun Lube partnered with Beijing-Zhangjiakou Railway in serving the Winter Olympics

On January 10, 2020, the Kunlun Lube Express departed from Beijing for its first ride along the Beijing-Zhangjiakou Railway, the world's first smart high-speed railway. This marked Kunlun Lube's partnership with the Railway in serving the transportation needs of the Winter Olympics 2022.

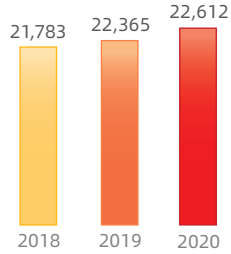
Gearbox lubrication is a key aspect of high-speed train technology. Through the unremitting efforts of our R&D team over decades, the first proprietary gearbox lubricant for the Fuxing (China Rejuvenation) bullet trains was developed. Our Kunlun Lube has been an official service provider of China's high-speed railway for three years, serving 80% of the Fuxing bullet trains running between Beijing and Shanghai.

Marketing and Sales

In 2020, based on a market-oriented approach, we improved linkage between production and distribution and built up marketing capabilities to maintain market share. We introduced a number of measures such as integrating, sharing and cross-industry partnership to create a multi-purpose service platform with "refined products, gas, hydrogen, electricity and non-fuel products", and provide our customers with one-stop services covering "people + vehicle + lifestyle".



Refined products sales (Domestic) (mmt)



Service stations (Domestic)

Refined Products

In 2020, amid the COVID-19 outbreak, drive-through refueling and contact-less payment services were promoted and online & offline marketing was stepped up, to ensure the reliable supply of fuels and other products during the pandemic, and to support production resumption. In line with market realities, we promptly adjusted marketing strategies and carried out tailor-made marketing for different regions, varieties, products, time and customers. At some of our marketing branches, the Amoeba business model was piloted to improve marketing ability and profitability. We sold 106.51 million tons of refined products throughout the year in China.

Marketing Network

In 2020, we further expanded our marketing network by optimizing assets management and developing differentiated strategies. We built 425 new service stations and put into operation 404 service stations. As of the end of 2020, we have a total of 22,612 service stations in operation across the country.

The Service Station 3.0 program was sped up. Contactless and fast services were available at our more than 20,000 service stations in the form of smart refueling and self-service

A CNPC smart service station

convenience stores. The number of online users exceeded 100 million in 2020. We launched smart solutions including e-payment, membership and marketing, cross-sector collaboration, oil products logistics and intelligent video recognition etc. to provide strong support for innovative marketing ideas and services models.

According to the brand ranking and analysis report of the 2020 China Brand Power Index (C-BPI) released by Chnbrand, CNPC ranked the first among China's fuel retailers for the fourth consecutive year.

Non-fuel Business

We continued to deepen partnership with finance, transportation, automobile, insurance, travel, catering, entertainment and other sectors to expand both online and offline marketing of refined products, pre-paid fuel cards, non-fuel products and lubricants, by leveraging internet technology, big data and cloud computing. In 2020, our car services, e.g. carwash, picked up pace; fast food services progressed steadily; own-label products marketing made headway. Our sales revenue from non-fuel products totaled RMB 24.5 billion throughout the year.

During the pandemic, we offered drive-through, deliver-to-the-door and community-based services to boost sales of grains, cooking oil, food and other daily necessities. In addition, we helped over 100 enterprises and farmers find market for more than 100 tons of fresh fruits and vegetables. The company also launched a 100-day campaign to promote sales of high-quality products from poverty-stricken areas through our online marketing network.

The brand value of our non-fuel brand uSmile reached RMB 12.632 billion, ranking second on the list of China's retail brands, according to the 2020 China Brand Evaluation Press Conference co-hosted by China Council for the Promotion of International Trade, China Brand Building Promotion Association, and China Appraisal Association.

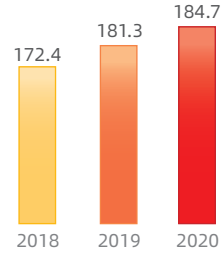
Wuhan Hongtu Avenue Service Station did a great job in fighting the pandemic

In 2020, CNPC Hongtu Avenue Service Station in Wuhan was named "advanced collective in China's fight against COVID-19" as the only service station in China to receive this honor.

Adjacent to Wuhan Jinyintan Hospital and Makeshift Hospital, the station was under extreme risk of infection. The entire team remained on duty 24 hours a day during the outbreak of COVID-19 to ensure fuel supply to hospital ambulances and the COVID-19 prevention and control command center nearby, and delivered much-needed vegetables and other daily necessities to isolation sites in the neighborhood. During the 67 days of lockdown, the service station served 334 vehicle/times from Jinyintan Hospital and Makeshift Hospitals, made 36 fuel delivery trips and provided 93.9 tons of fuels, playing an important role in Wuhan's COVID-19 prevention and control efforts.

Natural Gas Sales

In 2020, domestic natural gas demand continued to grow, but at a slower pace. Based on a market-oriented approach, we coordinated the production, storage and distribution processes, boosted domestic reserve increment and production ramp-up, diversified overseas imports, optimized production operations, expanded the end-user markets and improved customer services. We actively promoted the "gasification" and "replacing coal with natural gas" campaigns in the Beijing-Tianjin-Hebei region, Fen-Wei Plain, Yangtze River Delta and Pearl River Delta and took necessary measures to meet the need for winter heating. We sold 184.7 billion cubic meters of natural gas in the domestic market in 2020, up 1.9% year-on-year.



Natural gas sales (Domestic)
(bcm)

Natural Gas Marketing

We continued to push ahead with a three-year action plan on end-user market exploration and made headway in expanding market share by pushing for more gas consumption from key areas and large users, moving faster to bring our own end-user facilities and new direct-supply customers on stream, and carrying out pilot marketing around oil and gas fields. A number of major projects were implemented in Wuhan, Yinchuan and other provincial capitals and key cities. As our distribution network extended to remote areas, the "Tibet Gasification" and "Yunnan Gasification" projects advanced greatly. The first LNG filling station in Tibet became operational. We stepped up collaboration with business partners in power generation, power grid and energy internet, promoted innovative business models for distributed energy, CHP and energy performance contracting, and participated in natural gas power generation and natural gas supply line projects. In 2020, we signed 248 framework agreements for exploring end-user markets.

As of the end of 2020, our natural gas marketing network covers 31 provinces, municipalities and autonomous regions and Hong Kong SAR. The end-user sales volume totaled 42.18 billion cubic meters throughout the year, with a significant increase of 31% over the previous year.

Liquefied Natural Gas (LNG)

We further bolstered the peak-shaving capacity. Based on a holistic approach to LNG operation planning, LNG facilities were built or expanded to create an offshore hub of gas resources. The Jingtang LNG peak-shaving project reached mechanical completion and phase-III of Jiangsu LNG terminal project advanced steadily. After completion, these projects will further bolster peak-shaving capacity and the ability to cope with extreme weather conditions, and optimize energy mix in the Beijing-Tianjin-Hebei and Yangtze River Delta regions. We worked closely with local governments to facilitate the funding and construction of LNG terminals in Shandong, Guangdong, Fujian and Hainan. In Guangdong, we planned to build the first international offshore LNG filling center in Shenzhen.

As of the end of 2020, CNPC has three LNG terminals in Jiangsu, Dalian and Tangshan, with a total annual gasification and loading volume of 17.76 billion cubic meters. In 2020, we had 15 LNG plants in operation, with a total LNG processing volume of 2.41 billion cubic meters.

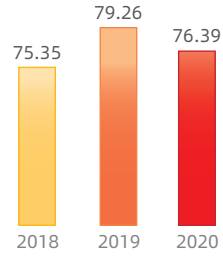
Ensuring gas supply to Lhasa

In 2010, the Tibet Gasification project was kicked off to deliver natural gas from the Sebei gas field in Qinghai to support the economic development of Tibet. In 2011, the world's highest natural gas station became operational in Lhasa, providing Lhasa with access to natural gas for the first time in history.

Over the past 10 years since its start, the natural gas station has delivered safely and steadily 220 million cubic meters of natural gas to the city of Lhasa. As of the end of 2020, the supply of natural gas in Lhasa has covered the 110,000 households in the city proper.

Overseas Oil and Gas Operations

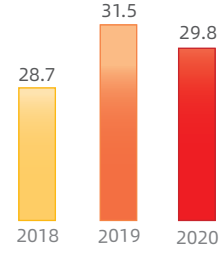
In 2020, we continued to promote international cooperation particularly along the Belt and Road route based on the optimized investment structure and regional footprint in Central Asia-Russia, Middle East, Africa, Latin America, and Asia-Pacific. Our managerial capability of global operation continued to improve. Due to the COVID-19 pandemic and the slump in oil prices, our overseas operations were facing unprecedented challenges. Even so, we managed to keep our overseas projects running smoothly by coordinating business operations and pandemic control efforts. Our overseas equity oil and gas outputs stabilized at 100 million tons of oil equivalent, with a drop in both all-in cost per barrel and lifting cost per barrel compared with 2019. As of the end of 2020, our investment in oil and gas business covers 35 countries and regions around the world.



Overseas crude production (Equity)
(mmt)

Oil and Gas Exploration

In 2020, we continued to expand overseas exploration activities and made a number of new discoveries. The Buzios project in Brazil identified more than 500 million tons of proven oil reserves; the Doseo basin in Chad, the Bilma block in Niger and the Akzhol structural belt in the central block of Kazakhstan's pre-Caspian basin showed a very promising prospect as reserve replacements; new discoveries were made in Block 17 of Andes Project in Ecuador, Agadem Block in Niger and PK Block in Kazakhstan through progressive exploration; an exploratory breakthrough was made in the lithological complex trap of the Oman project.



Overseas natural gas production (Equity)
(bcm)

Oil and Gas Production

In 2020, focusing on economic returns in overseas operations, we adopted a well-planned and refined approach to project management and managed to stabilize production in mature fields, speed up development activities in new fields and maintain stable outputs as a whole, through field lifecycle management and differentiated development plan of oil and gas fields. Our overseas operations yielded 176.64 million tons of oil equivalent, in which CNPC's share was 100.09 million tons. In particular, the total output included 148.07million tons of crude oil and 35.9 billion cubic meters of natural gas, with CNPC's share being 76.39 million tons and 29.8 billion cubic meters, respectively.

Layout of overseas oil and gas operations

Central Asia-Russia	Middle East	Africa	Latin America	Asia-Pacific
Core oil and gas cooperation zone under the Belt and Road Initiative	High-end cooperation zone that gives full play to our integrated business advantage	The most influential cooperation zone for the development of conventional oil and gas resources	Unique cooperation zone for the development of unconventional and deepwater oil and gas resources	Important cooperation zone for natural gas and integrated projects

Central Asia-Russia

We operate more than 20 cooperation projects in Russia, Kazakhstan, Turkmenistan, Uzbekistan and other countries in the Central Asia-Russia region. Oil and gas cooperation with this region continues to deepen as the Belt and Road Initiative advances steadily. In 2020, the fourth train of Yamal LNG proceeded smoothly towards its planned launch in the first half of 2021; the module fabrication works for the Arctic LNG-2 Phase-II kicked off. A breakthrough in capacity expansion was achieved in the Amu Darya Territory B East Phase I in Turkmenistan, going more than half way through the surface works for the 1 bcm/a project.

The Middle East

Under a diversified development concept, we continued to optimize our asset structure and business portfolio in the UAE, Iraq and Oman. Based on an innovative cooperation mechanism, we registered a rapid growth in oil and gas operation. In 2020, the Abu Dhabi Onshore-Offshore Project Phase-I became fully operational and the offshore Bu Haseer oilfield was in full swing. The third phase of the 150 MW/a power station at Halfaya project in Iraq was connected to the local grid.

Africa

Africa is one of our key overseas conventional oil and gas cooperation regions. We have oil and gas assets in Sudan, South Sudan, Niger, Chad and other African countries. In 2020, the upstream project in Chad added 700 Kt/a to the existing production capacity and a 490 Kt/a project moved forward steadily at PSA Block with five oil fields already in operation. The Agadem Oilfield Phase II, a project expected to enter production in 2023, progressed as planned in Niger. With modules installed on the Coral floating liquefied natural gas (FLNG) vessel in Area-4, Mozambique, the project continued with integration and commissioning activities.

Latin America

We continued to improve the development efficiency of the ultra-heavy oil project in Venezuela, and to improve our management capabilities for the deep-water project in Brazil. In 2020, the floating production storage and offloading (FPSO) unit at Mero 1 Block of the Libra project proceeded smoothly, which was expected to reach a daily capacity of 180,000 barrels by the end of 2021; the exploration projects of the Buzios and Alam blocks saw a full start-up. Measures were taken to stabilize production in a cost-effective manner at Andes Block in Ecuador, and Block 10 and Block 6/7 in Peru.

Asia-Pacific

Our oil and gas development and integrated projects in Indonesia, Mongolia, Australia and other countries in the Asia-Pacific region remained stable. The final investment decision on the Surat Phase-I of Arrow Energy was approved. The LNG Canada project was one third completed out of the overall development schedule.

Halfaya project, Iraq

Pipeline Construction and Operation

With a focus on operation management, coordination and hazard control, our overseas long-distance pipelines, including the Central Asia-China Gas Pipeline, Myanmar-China Oil and Gas Pipelines and Kazakhstan-China Crude Pipeline, remained safe and reliable operation, delivering 26.88 million tons of crude oil and 44.8 billion cubic meters of natural gas throughout the year. As of the end of 2020, CNPC had built a total of 14,996 kilometers overseas oil and gas pipelines, including 7,091 kilometers for crude oil and 7,905 kilometers for natural gas.

Steady progress was seen in key overseas pipeline projects under construction. In Central Asia, the Kazakhstan Northwest Crude Pipeline Phase-I revamp project became operational and the Phase-II project was half way through completion; the metering station revamp project for the Kenkijak-Kumkel section of the Kazakhstan-China Crude Pipeline was completed; the 15 bcm/a capacity expansion project for the second Kazakhstan-China Gas Pipeline (South Kazakhstan section) was launched; the Central Asia-China Gas Pipeline-Line D project made positive progress. In Africa, the Niger-Benin Crude Pipeline and the Chad Crude Pipeline expansion project saw substantial progress.

Dai Houliang attended a high-level video conference for partners of Russia's Arctic LNG-2 Project

Refining and Chemicals

In 2020, our joint-stock refineries in Kazakhstan, Niger, Singapore, UK and France maintained safe and stable operation, processing 31.81 million tons of crude oil throughout the year. In response to a lower level of capacity utilization, the Shymkent refinery in Kazakhstan optimized production arrangement and adjusted its product mix to increase profitability. The N'Djamena Refinery in Chad started to export refined products to Central Africa and Cameroon. The Zinder Refinery in Niger increased delivery to Burkina Faso, Mali and other markets.

Project Cooperation and Development

With active and prudent partnerships throughout the industrial chain, we share development opportunities with international partners. In Brazil, an agreement on the Aram exploration projects was signed and delivered, and the production sharing contract for the Buzios project was concluded. In Kazakhstan, extension agreements were signed for the Aktobe exploration project and the PK development project.

Weathering the pandemic storm, CNPC has been unswerving in its opening-up and collaboration. During the 3rd China International Import Expo, the CNPC International Cooperation Forum was held. This event saw more than 30 procurement contracts signed between CNPC and more than 30 foreign suppliers, including Schlumberger, Siemens and Baker Hughes.

Throughout the year, Dai Houliang, chairman of CNPC, attended a number of important industry events including the video conference of the Russian Arctic LNG-2 project shareholders, the special virtual meeting of the Abu Dhabi CEO Roundtable 2020, a video conference of the BRICS Business Council and the opening ceremony of the 17th China-ASEAN EXPO (CAEXPO) and China-ASEAN Business & Investment Summit (CABIS).

We also engaged in active communications both online and offline with business partners such as Shell, Total, Equinor, etc. over new opportunities and new measures for oil and gas cooperation amidst the pandemic, in a bid to share wisdom in the process of creating a new energy order and a new energy landscape globally.

Coping with the challenges of COVID-19 and the low oil prices in our overseas operations

The onslaught of the COVID-19 pandemic and the plummeting oil prices have put massive pressure on both the supply and demand sides of the global oil and gas market and posed unprecedented risks and challenges to CNPC's overseas oil and gas investments. Under the action plan for quality and efficiency improvement, we made timely adjustment in production deployment and introduced a coordinated and effective mechanism for pandemic control to ensure stability and safety in our overseas operations and achieve a positive net profit and a positive net cash flow, while keeping our employees healthy and safe.

Strict pandemic prevention and control to ensure smooth business operation. We have developed and implemented a company-wide four-tier pandemic prevention and control mechanism, i.e. headquarters, business segments, subsidiaries with international business, and overseas projects, and set up seven overseas regional coordination groups that covers 78 countries/regions. A comprehensive pandemic prevention and control system incorporating management and technical support resources is put in place for pandemic control in our overseas operations. Employees working on overseas projects received training on risk awareness and prevention knowledge, together with a range of medical services and mental health services, to ensure zero infection in workplace and zero clusters s among employees. As of the end of 2020, our overseas projects reported zero Covid-19 deaths. Meanwhile, we have been playing an active role in a world effort to fight the pandemic by supporting local communities and working with business partners in sharing expertise in prevention, control and treatment, in a bid to contribute to the global pandemic response efforts.

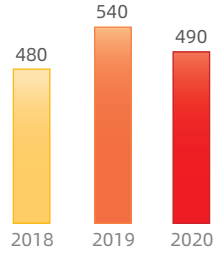
Deepening geological research to consolidate the resource base for high-quality development. We have further strengthened the planning and research of exploration projects and improved the effectiveness of appraisal wells for key projects to support well deployment and well siting, with an aim to discover more recoverable reserves amid a dramatic decline in the number of exploration wells. In 2020, the first two exploration and appraisal wells drilled at Buzios in Brazil led to major discoveries, further verifying the size of oil in place and underpining the resource base for development planning.

Optimizing development deployment in a holistic approach to enhance performance and benefits. We strive to enhance the performance and economic returns of overseas oil and gas development with a focus on field lifecycle management, research on development strategies and a holistic and optimized approach to deployment. In 2020, a number of development plans were optimized and the innovative production technologies showed promising results in upstream projects in Halfaya, Al-Ahdeb and Chad. Based on a refined approach to oilfield management, targeted measures for controlling water cut and increasing recovery efficiency were implemented to boost output at mature fields in Central Asia, Africa and the Americas.

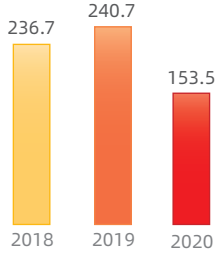
Strengthening management and improving quality and efficiency to gain cost competitiveness. Under the special action plan for quality and efficiency improvement, we have continued to boost production and reduce costs by optimizing management and technical process, stepping up cost control and improving drilling rate and efficiency. Contracts were reviewed for oil projects in Chad and Mozambique to reduce drilling costs. One of our projects in the Middle East saved tens of millions of dollars in operating expenses throughout the year, thanks to the optimized planning, process and well-organized operation and maintenance activities. The Chad project introduced whole well combined drilling, seeing increased bit speed and reduced cost in drilling and completion.

International Trade

In 2020, our trading activities maintained a focus on improving our ability of global resource allocation. Trading and shipping of crude oil, refined products, natural gas and chemicals remained stable, thanks to optimized oil and gas imports, increased sales of our equity production overseas, and growing refined product exports with stronger presence in the high-end, high-value market. Our global oil and gas trading network continued to grow, covering more than 80 countries and regions around the world. Our three international operation hubs in Asia, Europe and the Americas continued to bolster operation management and build up the ability to operate and trade across regions and markets. We posted a trade volume of 490 million tons and sales revenue of USD 153.5 billion for 2020.



International trade volume
(mmt)



International trade value
(billion USD)

Achievements in Core Operations

In 2020, we saw a steady improvement in services, marketing and trading capabilities reflected in increased sales of our overseas equity production, flexibility in refined product export plans, well-paced gas imports, expanded access to overseas chemicals markets and integration of shipping services.

Crude Trading

We made all efforts to optimize the allocation of crude oil resource globally and made steady headway in marketing our overseas equity production. Our capability in benchmark oil trading was improved through diversifying procurement channels and product categories, fine-tuning crude imports and adopting flexible hedging strategies. We continued to trade in oil futures at Shanghai International Energy Trading Center with trading volume and delivery volume hitting new highs, trading patterns continuing to innovate, the number of registered warehouse receipts staying at the top and warehouse capacity increasing remarkably. Our storage tanks with a capacity of 200,000 cubic meters in Qinzhou of Guangxi were used as the bonded delivery warehouse of futures, further improving the marketing network in Southwest China and the ASEAN markets.

Refined Products Trading

The trends in the domestic and international markets were watched closely and necessary changes to export plans were made in a timely manner with a focus on high-end, high-value and cross-regional markets. Marketing efforts in emerging energy markets were stepped up to make new breakthroughs in gasoline and diesel exports in Jordan, Chile, Peru, India, Pakistan and Brunei etc. Aviation refueling operations continued to expand with an aviation refueling network covering 32 airports in 15 countries/regions around the world. Biodiesel trade made progress worldwide. The low-sulfur marine fuel business got off to a good start as a number of refineries, e.g. Changqing Petrochemical and Guangxi Petrochemical, shipped out their first low-sulfur marine fuel exports. We actively participated in fuel oil futures trading on the Shanghai Futures Exchange and developed the novel model of "domestic settlement + overseas delivery" for the low-sulfur fuel oil futures.

Natural Gas Trading

Our natural gas imports were fined-tuned with a balanced portfolio of pipeline gas sources and well-paced LNG shipping schedules to ensure natural gas supply. The East-Route of Russia-China Gas Pipeline made a smooth transition from trial run to commercial operation and helped improve natural gas security. A global LNG resource pool was under construction with an aim to promote integrated trade operations around the globe. We invested in creating our own LNG carrier fleet and kicked off the construction of our first LNG carrier.

Chemicals Trading

We achieved remarkable results in the spot and futures trading of key chemicals, as chemical fiber materials and urea gained momentum and olefin progressed steadily. We actively sought growth potential for chemicals business, achieving substantial progress in light hydrocarbon and listed and traded the first LPG futures contract on the Dalian Commodity Exchange.

Freight Shipping

Our shipping operations were further optimized and integrated to bolster a growing global presence, embrace information technology and offer freight forwarding services to hedge against the volatility of freight rates amidst market turbulence.

International Operation Hubs

Our three international operation hubs in Asia, Europe and America showed progress in bolstering operational efficiency. By operating across regions, markets, and products, they were upgraded to "global hubs" running on a 7×24 global relay.

The Asian operation hub continued to bolster Basra crude oil operations and leveraged long-term contracts, spot and floating warehouses to tap the potential in key regional markets. With a stronger foothold in high-end refined product markets, we leveraged our downstream network and logistics strengths to increase market share steadily in Myanmar, Indonesia, Thailand, and Japan and become the largest gasoline supplier in India market. We became one of Asia's major cross-market operators as gasoline and diesel operations advanced and LNG trading continued to grow.

The European operation hub continued to participate in North Sea crude deals and bolster its warehousing and logistics operations. Cross-regional trading in refined products became regular as inter-market activities saw a steady increase in trade volume. The hub made its way to a major biodiesel trader in the European market and China's largest biodiesel exporter as biodiesel business continued to expand. New breakthroughs were made in natural gas power generation and carbon emission reduction.

The American operation hub made headway with pipeline oil operations in North America and advanced crude oil business in Ecuador steadily in spite of extreme situations and headwinds such as WTI crude price going negative. Package solutions were developed for refined product customers to create a value-adding customer ecosystem. Pipeline operations in the United States and Canada were integrated and the LNG Canada project made commercial progress. Marketing efforts were stepped up to promote our olefin brand in the American market.

Guangxi Petrochemical Company's ship-to-ship transfer of imported crude oil at Qinzhou Port

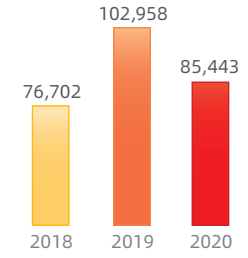
Supporting Business

Leveraging the company's integrated operation capabilities and expertise, our service business continued to optimize market layout, deepen collaboration with oil and gas operations, and strengthen technological innovation and lean management. In 2020, our service quality and market competitiveness in oilfield services, engineering and construction, equipment manufacturing and financial services continued to improve, providing a strong support to the company's operational efficiency across the industrial value chain.

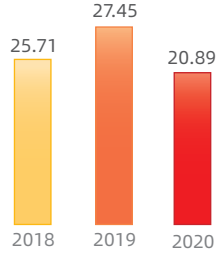
Oilfield Services

In 2020, in line with the "Innovation+ Year" initiative, our oilfield services arm launched demonstration drilling projects and deployed key actions for enhancing fracturing speed/efficiency to promote a wider adoption of new techniques. As a result, the service quality, efficiency and economic benefits were enhanced, greatly facilitating ramp-ups in oil and gas reserves and outputs.

The R&D and application of unique techniques and equipment were reinforced, resulting in new breakthroughs in terms of crucial know-how, cutting-edge tools and applications, and technical indicators. Technological progress in E&P of unconventional resources led to a range of proprietary techniques for shale oil and gas development. A number of technical solutions were worked out. Significant progress was achieved in developing the intelligent geosteering system, with many of its technical indicators topping similar systems. We promoted the digital and



3D seismic data acquired
(square kilometers)



Drilling footage
(million meters)

Oilfield services operations

		2018	2019	2020
Geophysical prospecting	2D seismic data acquired (kilometers)	105,739	56,551	18,027
	3D seismic data acquired (square kilometers)	76,702	102,958	85,443
Drilling	Wells completed	11,264	11,571	9,302
	Drilling footage (million meters)	25.71	27.45	20.89
Well Logging	Well logging operations (well-times)	106,963	105,746	84,721
Mud logging	Mud logging operations	14,256	13,175	10,011
Downhole operations	Downhole operations (well-times)	87,007	87,563	80,553
	Formation test (layers)	11,969	7,602	9,998
Offshore engineering	Offshore drilling footage (meters)	72,500	264,700	301,100

intelligent transformation in our oilfield services, pushed ahead with the building of engineering intelligence support centers (EISC), developed and deployed the engineering intelligence support system (EISS). Based on internet+ technologies, automatic acquisition and remote monitoring were integrated into technical support, decision-making, early warning and command functions, with the adoption rate in key wells or wells deeper than 5,000 meters increasing from 55% to 100%.

Marketing efforts delivered strong results as the value of newly signed contracts in overseas markets increased by 8.5% year-on-year. Iraq, Saudi Arabia, UAE and other traditional markets continued to perform well and saw a number of important agreements being concluded, including Block 9 Drilling and Maysan Workover & Capacity Expansion in Iraq, T-Oilfield Drilling Integration in Ecuador, Saudi Aramco Onshore Geophysical Prospecting and Acquisition, and OBN Acquisition in UAE. Year-on-year growth was achieved in technical services for directional wells, horizontal wells, geosteering, acidizing and stimulation. In addition, we extended our reach to the marine geophysical prospecting market in Gambia, UK and Norway for the first time.

As of the end of 2020, CNPC offered geophysical prospecting, drilling, well logging, mud logging, downhole operation and offshore engineering services in 49 countries.

Geophysical Prospecting

In 2020, CNPC acquired data of 18,027 kilometers of 2D lines and 85,443 square kilometers of 3D profiles.

Innovative technologies were widely used in geophysical prospecting, leading to a number of major oil and gas discoveries. In China, R&D efforts were focused on new areas, new types of resources and risk exploration activities, especially integrated solutions and key techniques such as imaging for surface complexities/structural complexities, high-fidelity and high-resolution interpretation and processing. Overseas, front-end technical support was strengthened and "broadband, wide azimuth and high density" seismic prospecting was widely used, leading to breakthroughs in exploration activities in the Bongor basin in Chad, the Niger project and the central block of Kazakhstan's pre-Caspian basin. The company became a top player in the global Ocean Bottom Node (OBN) market in terms of market share and operated large-scale OBN projects such as Brunei Shell and bp Caspian efficiently.

Drilling

In 2020, we spudded 9,081 wells and completed 9,302 wells, with a total footage of 20.89 million meters.

A range of speed and efficiency boosting campaigns were rolled out, including factory drilling and fracturing, rotary steering drilling of shale gas reservoirs, deep/ultra-deep/exploratory wells drilling and drilling technology demonstration projects. Technical indicators constantly improved as a number of high-yield oil and gas wells were completed, setting new records for China's deepest horizontal well drilled onshore and longest horizontal section drilled onshore etc. Technical guidance were provided by experts to improve drilling activities at Mahu in Xinjiang and Sichuan-Chongqing shale gas blocks, leading to a 28% increase in drilling speed at Mahu.

Well Logging and Mud Logging

In 2020, we completed 84,721 well-times of well logging and perforation and 10,011 well-times of mud logging.

Focusing on imaging logging, express logging and logging while drilling, integration/R&D of frontier technology and adoption of proven technologies picked up pace. The CPLog remote logging

Seismic acquisition in Oman

system, a unified acquisition and interpretation solution, continued to evolve. R&D programs such as high-performance neutron generator, high-sensitivity transducer and main control chip etc. were under way. New technologies such as 3D induction logging and formation element imaging logging were widely used. The first-trip success rate was up to 99.6% for domestic logging probes and 97.7% for logging measurements as a whole; the high-quality rate for logging curves was up to 99.0%; and the composite interpretation consistency rate was up to 95.4%, indicating a significant improvement in quality and efficiency.

Unique supporting techniques in geochemical logging, element logging, and geosteering were developed for mud logging activities targeting oil and gas reservoirs with different characteristics. Monitoring systems for early detection of leaks and spills and online monitoring and evaluation systems for flowback cuttings were widely deployed.

Downhole Operations

In 2020, we completed 80,553 well-times of downhole operations including 9,998 layers of formation testing and 53,000 intervals of fracturing.

Downhole operations saw continuous improvement in quality, speed, production and efficiency as a result of a range of targeted measures, including optimized operating modes, factory fracturing competition, fracturing speed-up project, promotion of SRV fracturing 2.0 techniques and casing deformation control. A number of high-yield oil and gas wells were identified at the Tarim, Sichuan, Xinjiang and Liaohe fields as risk exploration and formation testing for deep and ultra-deep wells continued to improve. R&D and deployment of techniques and equipment for downhole operations picked up pace as new breakthroughs in coiled tubing, and intelligent segmentation of horizontal wells etc. were achieved.

Offshore Engineering

We deployed 16 offshore drilling rigs, 5 production test/production platforms, 41 vessels to spud 106 and complete 109 offshore wells throughout the year, with a total drilling footage of 301,100 meters.

Based on a market diversification strategy, we provided offshore engineering services in well drilling, completion, cementing, production testing, downhole operation, offshore engineering design and construction etc. in Bohai Bay, South China Sea, Persian Gulf and other sea areas. The Chenghai New Area Project, Zhaodong Project and Jidong Oilfield Project progressed steadily. Liaohe Oilfield's offshore exploration task and CPOE 281 Nigeria project were successfully completed. We received an order for a floating system project from SBM, a Dutch company. In addition, we moved into the offshore wind farm installation market and were awarded a number of wind power booster station contracts.

In 2020, the CNPC contracted second-round of gas hydrate production test in the South China Sea proved successful and made a big leap from "exploratory production" to "trial production" by leveraging the novel sand control solution and integrated underwater "test tree" system, making it a realistic possibility to develop and utilize gas hydrate as a high-efficiency clean energy source.

Engineering and Construction

In 2020, we saw continuous improvement in project management and construction capabilities and steady progress in a number of key projects, with a focus on strengthening project lifecycle management and pushing ahead with standardized design, factory precasting, modular construction, mechanized operation, and IT-based management. As of the end of 2020, we performed 75 major projects in oil and gas field surface engineering, refining and petrochemicals and storage and transportation at home and abroad.

Oil and gas field surface engineering: Changqing Oilfield's Shanggu Natural Gas Processing Plant, Xinjiang Oilfield's Mahe gas field pressurization and cryogenic refrigeration project and Tarim Oilfield's Akmomu gas field surface works became operational. Southwest Oil and Gas Field's Changning shale gas capacity ramp-up and Tarim Oilfield's ethane recovery project moved forward steadily. The Bab field upgrading project in UAE, the Amur Gas Processing Plant in Russia and other major overseas projects progressed smoothly. The Contract Territory B East Gas Field Project Phase II in Amu Darya, Turkmenistan, got off to a good start.

Storage and transportation: Projects aimed at strengthening gas pipeline interconnectivity, such as the mid-section of the East-Route of Russia-China Gas Pipeline, Shenzhen LNG distribution pipeline and West-East Gas Pipeline Fuzhou spur line, were put into operation. Construction of the south section of the East-Route of Russia-China Gas Pipeline, Tianjin Nangang LNG terminal and its distribution pipeline, Zhuozhou-Yongqing natural gas pipeline started. Projects at Tangshan, Jiangsu and Shenzhen LNG terminals were well under way. Haradh Natural Gas Pipeline in Saudi Arabia was completed. Construction of underground gas storages was given a boost as Jilin Oilfield's Shuangtuozi project successfully completed the first injection period and Tuha Oilfield's Wenjisang project kicked off.

Refining and chemicals facilities: Daqing Petrochemical's refining plant restructuring/upgrading project, Daqing Refining & Petrochemical's olefin capacity ramp-up project, Lanzhou Petrochemical's ethylene capacity restoring project and diesel hydrogenation project, and Changting catalyst project in Fujian, became operational. The integration project at Guangdong Petrochemical and the ethane-to-ethylene projects at Changqing and Tarim picked up pace. A polypropylene project in India and a refinery revamp project in Algiers were successfully commissioned. Tianli High & New Tech's 200 Kt/a EVA project was launched.

We continued to explore new markets and new business opportunities, optimized the global layout to develop a portfolio of stable, profitable and large-scale markets. The marketing efforts showed good results around the world. We were awarded a number of major projects, including the sour gas treatment facility and mechanical power units of the Majnoon oil field in Iraq, debottlenecking project at Habshan's No.5 natural gas processing plant in UAE and Basra Gas Company's pipeline project in Iraq etc.

Petroleum Equipment Manufacturing

The year 2020 saw a boost in the productivity and profitability of our equipment manufacturing business as a result of transformation and upgrading, lean management, and service-oriented manufacturing. Our marketing and service network continued to grow with overseas branches in Central Asia, Latin America, the Middle East, Africa, Asia-Pacific and other regions. In 2020, we sold petroleum equipment to more than 80 countries and regions around the world.

The shift to "full-process improvement" and "lean plant & lean business", emerging in our lean management practices, spread from a single team/workshop to all manufacturing facilities as continuous improvement was made in process-based production, standard-based operation, visibility-based management and intelligent production.

We continued to promote the transition to "manufacturing + service" and "product + service" and extend the value chain by exploring innovation in service-oriented manufacturing, increasing the value of service, investing in manpower and physical resources for service operations and offering a wider variety of services and a better user experience in line with market demand.

Automation-based and IT-driven smart manufacturing advanced, highlighting the use of big data to create highly-efficient smart production lines. Baoji Steel Pipe Co., Ltd., a subsidiary of CNPC, was named 2020 Smart Manufacturing Pilot Demonstration Enterprise in Shaanxi Province by the Industry and Information Technology Department of Shaanxi Province.

We stepped up R&D efforts on key technology and equipment. New breakthroughs were made in developing automated drilling rig, large-diameter steel pipe, ultra-high-capacity coiled tubing, and gas engine etc. as world-leading products in terms of overall performance were launched. Applied research on energy transition made headway with an equipment manufacturing system being planned to cover five major energy sources, i.e. oil, natural gas, geothermal energy, electricity and hydrogen.

Marketing efforts were boosted, leading to the conclusion of new contracts in Guatemala, Cambodia, Cameroon, Maldives and other markets. Pipe manufacturing for the Niger-Benin Crude Pipeline, AKK Gas Pipeline in Nigeria, and anti-corrosion pipeline project in Libya moved forward steadily.

Financial Services

CNPC provides a wide range of financial services, including in-house banking, banking, financial leasing, trust, insurance, insurance brokerage, and securities, etc.

In 2020, focusing on industrial finance, our capability to offer high-quality financial services continued to build up in support of the core oil and gas operations as efforts were pressed ahead with financial-industrial combination and synergy-achieving among various financial operations to improve the efficiency of capital operation. We continued to bolster our risk management system and ensure the adequacy of internal control, risk coordination and sharing mechanism, and early warning and emergency response mechanism, as indicated by key financial risk indicators remaining superior to CBRC's thresholds and non-performing asset ratio at a very low level in the industry. IT-driven transition from traditional finance to "smart finance" picked up pace as intelligent outlets, mobile applications and report visualization systems enabled a remarkable improvement in our ability to offer digital and intelligent services.

CNPC Capital, a subsidiary of CNPC, made the 2020 Top 100 Listed Companies list in China released by Warton Economic Institute and received again the Top 100 Chinese Enterprises Award and China Ethical Enterprise Award, indicating ever-growing industry competitiveness and brand influence.

Financial Statements

Consolidated Balance Sheet

million RMB yuan

Item	2018	2019	2020
Current assets			
Cash and cash equivalent	229,910.44	235,219.65	229,805.98
Funds lent	212,766.93	218,250.12	185,735.05
Financial assets held for trading	80,164.85	71,433.97	90,336.79
Derivative financial assets	270.98	216.93	1,517.35
Notes receivable	2,725.78	511.90	705.98
Accounts receivable	104,757.04	102,826.89	81,434.34
Receivables under financing	15,897.36	7,562.56	8,261.93
Prepayments	202,177.11	158,604.29	202,726.16
Premium receivable	117.35	94.12	69.62
Reinsurance accounts receivable	626.58	615.50	845.91
Reinsurance reserves receivable	1,332.93	1,291.31	1,642.82
Other receivables	23,793.52	30,613.57	36,270.47
Financial assets purchased under resale agreements	30,736.27	10,957.11	24,700.22
Inventories	249,224.40	257,020.86	177,126.67
Contract assets	-	0.01	59,720.40
Assets held for sale	-	-	42,612.74
Non-current assets maturing within one year	134,266.38	168,726.62	140,145.28
Other current assets	114,144.19	132,878.14	144,217.31
Total current assets	1,402,912.11	1,396,823.55	1,427,875.02
Non-current assets			
Loans and advances issued	63,784.31	29,149.65	116,262.45
Debt investments	94,929.89	93,385.88	95,439.55
Other debt investments	38,813.56	40,430.82	42,224.44
Long-term accounts receivable	57,139.13	54,294.96	52,329.15
Long-term equity investments	116,215.01	154,018.37	292,118.13
Other investments in equity instruments	9,062.48	10,778.95	9,081.59
Other non-current financial assets	28,416.92	42,810.70	53,528.19
Investment properties	2,573.44	2,855.36	2,475.44
Fixed assets	891,236.22	905,281.70	585,065.95
Construction in progress	252,692.12	277,849.67	252,217.09
Productive biological assets	0.19	0.15	-

Consolidated Balance Sheet (continued)

million RMB yuan

Item	2018	2019	2020
Oil and gas assets	930,672.37	970,722.41	944,188.74
Right-of-use assets	-	-	-
Intangible assets	93,610.71	100,875.87	101,544.28
Development expenditure	1,274.99	1,251.68	963.68
Goodwill	42,363.05	42,905.99	8,218.11
Long-term deferred expenses	37,503.24	46,604.68	52,474.45
Deferred tax assets	32,969.78	33,542.12	20,542.86
Other non-current assets	35,094.16	32,159.61	32,124.71
Total non-current assets	2,728,351.57	2,838,918.57	2,660,798.81
Total assets	4,131,263.68	4,235,742.12	4,088,673.83
Current liabilities			
Short-term loans	80,876.11	102,286.47	71,623.21
Borrowings from central bank	1,817.19	1,331.12	2,624.23
Borrowing funds	72,101.24	65,139.67	50,392.82
Derivative financial liabilities	404.88	3,551.41	4,698.08
Notes payable	27,914.56	41,554.65	60,397.70
Accounts payable	361,643.93	379,410.75	331,213.44
Receipts in advance	36,584.48	32,884.98	5,932.95
Contractual liabilities	67,605.49	81,784.64	114,449.18
Funds from sales of financial assets with repurchase agreement	28,041.50	30,324.45	26,671.98
Deposits from customers and interbank	200,926.68	198,436.48	200,083.54
Funds arising from acting trading of securities	0.01	0.01	0.01
Employee benefits payable	33,896.29	44,763.16	38,931.87
Taxes payable	85,638.38	78,407.69	72,405.53
Other payables	69,861.56	79,106.03	84,212.70
Handling charges and commissions payable	30.25	29.85	40.06
Reinsurance accounts payable	721.78	582.44	719.83
Liabilities held for sale	-	-	2,261.52
Non-current liabilities due within one year	121,243.22	72,592.67	59,828.46
Other current liabilities	65,670.41	88,604.46	57,946.62
Total current liabilities	1,254,977.96	1,300,790.93	1,184,433.73

Consolidated Balance Sheet (continued)

million RMB yuan

Item	2018	2019	2020
Non-current liabilities			
Reserve for insurance contracts	3,355.05	3,691.38	4,461.50
Long-term loan	21,264.60	21,146.92	54,104.05
Debentures payable	242,350.73	302,950.55	333,188.51
Lease liabilities	-	-	-
Long-term payables	9,359.01	5,668.89	5,021.67
Long-term employee remuneration payable	1,676.97	1,613.01	1,515.78
Accrued liabilities	158,725.49	164,026.22	139,443.84
Deferred income	16,982.99	23,790.49	12,808.10
Deferred tax liabilities	31,178.89	35,287.71	31,310.22
Other non-current liabilities	2,620.92	3,156.24	3,144.16
Total non-current liabilities	487,514.65	561,331.41	584,997.83
Total liabilities	1,742,492.61	1,862,122.34	1,769,431.56
Owners' equity			
Paid-up capital (or share capital)	486,855.00	486,855.00	486,855.00
Other equity instruments	150,468.79	104,727.09	147,702.14
Capital reserve	282,572.87	275,435.62	255,441.43
Other comprehensive income	-28,967.02	-14,870.81	-43,451.99
Special reserve	33,366.68	32,439.08	17,690.80
Surplus reserve	1,084,354.66	1,084,354.66	1,084,371.23
General risk provisions	10,946.07	11,663.96	11,857.50
Undistributed profit	-21,575.35	-10,996.23	18,121.74
Total equity attributable to CNPC	1,998,021.70	1,969,608.37	1,978,587.85
Minority interest	390,749.37	404,011.41	340,654.42
Total owners' equity	2,388,771.07	2,373,619.78	2,319,242.27
Total liabilities and owners' equity	4,131,263.68	4,235,742.12	4,088,673.83

Consolidated Income Statement

million RMB yuan

Item	2018	2019	2020
1. Turnover	2,739,011.50	2,771,434.92	2,087,146.80
Including: Operating revenue	2,713,819.61	2,747,058.33	2,064,488.05
Interest income	22,973.57	21,834.38	20,215.08
Premiums earned	329.92	707.50	696.22
Handling charges and commission income	1,888.40	1,834.71	1,747.44

Consolidated Income Statement (continued)

million RMB yuan

Item	2018	2019	2020
2.Total cost of operations	2,545,501.66	2,628,014.71	2,029,239.85
Including: Operating cost	2,092,669.12	2,139,324.00	1,587,693.90
Interest expenses	9,509.95	10,372.70	8,884.92
Handling charges and commission expenses	188.46	220.44	278.62
Net expenditure for compensation payments	300.80	400.64	505.07
Net amount of provision for insurance contract	309.75	340.35	305.26
Reinsurance costs	-67.05	133.29	180.61
Tax and surcharges	231,975.85	240,296.07	205,249.12
Selling expenses	78,649.64	83,884.02	79,366.75
Administrative expenses	97,589.36	99,857.52	79,018.52
R&D expenses	15,968.93	21,752.70	22,759.34
Finance expenses	-1,001.12	10,262.19	25,401.03
Others	19,407.97	21,170.79	19,596.71
Add: Other gains	12,800.72	13,021.95	11,530.91
Gain from investment (Loss is represented by "- ")	14,141.84	19,808.26	52,418.83
Exchange gain (Loss is represented by "- ")	210.58	62.43	105.56
Net exposure gains (Loss is represented by "- ")	-	-	-
Gains from change in fair value (Loss is represented by"-")	250.53	1,229.86	3,523.43
Credit impairment loss (Loss is represented by "- ")	554.24	-6,071.67	-796.91
Impairments loss of assets (Loss is represented by "- ")	-65,890.33	-26,895.70	-29,625.36
Gain on disposal of assets (Loss is represented by "- ")	1,384.13	1,462.36	1,829.43
3.Operating profit (Loss is represented by "-")	156,961.55	146,037.70	96,892.84
Add: Non-operating revenue	11,743.52	12,141.58	16,605.27
Including: Government grants	7,638.14	5,977.27	11,249.97
Less: Non-operating expenses	58,145.58	37,815.58	25,978.38
4.Earnings before taxes (Loss is represented by "-")	110,559.49	120,363.70	87,519.73
Less: Income tax expenses	67,757.04	60,772.82	37,248.11
5.Net income (Net loss is represented by "-")	42,802.45	59,590.88	50,271.62
(1) Classified by continuity of operations:			
Net income from continuous operation	42,802.45	59,590.88	50,271.62
Net income from discontinued operation	-	-	-
(2) Classified by ownership:			
Net income attributable to CNPC	15,018.84	30,695.67	31,568.74
Minority interest	27,783.61	28,895.21	18,702.88

Notes to the Financial Statements

A. Description of Principal Accounting Policies and Estimates

1. Accounting standard and system

CNPC (hereinafter referred to as the Company) follows Accounting Standards for Business Enterprises –Basic Principles and the specific rules of accounting standards, guidelines for the application of accounting standards, interpretations of accounting standards and relevant regulations issued by the Ministry of Finance.

2. The fiscal period

The fiscal period of the company starts on January 1 and ends on December 31 each calendar year.

3. Standard accounting currency

The Company and most of its subsidiaries adopt RMB yuan as currency used in bookkeeping. The consolidated financial statement of the Company is listed in RMB yuan.

4. Accounting basis and valuation

Accounting is based on the accrual system. Unless otherwise specified, all assets are measured at historical cost.

5. Recognition of cash and cash equivalents

The cash presented in the Cash Flow Statement comprises cash on hand and the deposits available for payment at any given time. Cash equivalents presented in the Cash Flow Statement are short-term (mature within three months), highly liquid investments that are readily convertible into cash and almost have no risk of change in value.

6. Foreign currency accounting and translation of financial statements in foreign currency

(1) Foreign currency accounting

Our foreign currency transactions are converted into RMB yuan at the spot exchange rate on the days the transactions occurred; the monetary foreign currency items on the balance sheet date are converted into RMB yuan at the spot exchange rate on the balance sheet date. The exchange gains and losses arising from these transactions that occurred in the production and operation period are recognized as financial expenses; those related to the acquisition and construction of fixed assets, oil and gas assets and other assets in line with the capitalization condition are handled according to relevant provisions on borrowing costs; and those occurred in the period of liquidation are recognized as liquidation gain or loss.

A non-monetary foreign currency asset measured at historical cost is converted into RMB yuan at the spot exchange rate on the trading day, with its amount in RMB yuan unchanged. A non-monetary foreign currency asset measured at fair value is converted into RMB yuan at the spot exchange rate for the date when the fair value is determined, with the difference thus caused recognized in profit or loss for the current period as a change in fair value.

(2) Translation of financial statement in foreign currency

All asset and liability items presented in Foreign Currency Balance Sheet are converted into RMB yuan at spot exchange rate on the balance sheet date; the owner's equity other than "undistributed profit" is converted at spot exchange rate when occurred. Foreign incomes and expenses presented in the Income Statement are generally converted at the average of reference rates for RMB announced by PBC on a daily basis over the period of time covered by the income statement. The exchange difference of Foreign Currency Balance Sheet arising from the conversions mentioned above is separately listed in "Converted Difference in Foreign Currency Statement" under the owner's equity. The exchange difference arising from monetary foreign currency items materially invested in foreign operation due to the change in exchange rate is also separately listed in the owner's equity when preparing consolidated financial statements. When disposing foreign operation, the related exchange difference is carried, in proportion, into profit or loss for the current period during which the operation is disposed.

The opening balances of cash and cash equivalents in the Foreign Currency Cash Flow Statement are converted at statement's initial exchange rate; and the closing balances are converted at the spot exchange rate on the balance sheet date. And other items are generally converted at the arithmetic average of reference rates for RMB announced by PBC on a daily basis over the period of time covered by the cash flow statement. The translation difference of cash flow statement arising from the conversions mentioned above is presented separately in "Effect of the Change of Exchange Rate on Cash".

7. Financial instruments

Financial instruments include cash at bank and on hand, equity securities other than those classified as long-term equity

investments, receivables, payables, borrowings, debentures payable and share capital, etc.

(1) Classification of financial assets

Financial assets are classified, upon initial recognition, by form of management and cash flow characteristics into: Financial assets measured at amortized cost, financial assets measured at fair value with changes in fair value recognized in other comprehensive income, and financial assets measured at fair value with changes in fair value recognized in profit or loss for the current period.

(2) Classification of financial liabilities

Financial liabilities are classified into: Financial liabilities measured at fair value with changes in fair value recognized in profit or loss for the current period and financial liabilities measured at amortized cost.

(3) Impairment of financial instruments

For financial assets measured at amortized cost, contractual assets, and debt investments measured at fair value with changes in fair value recognized in other comprehensive income, impairment losses and provisions should be based on expected credit loss.

8. Inventories

(1) Classification of inventories

Inventories include raw materials, work in progress and semi-finished goods, finished goods, goods sold, etc.

(2) Measurement method of cost of inventories

Inventories are carried at the actual cost when acquired, using perpetual inventory method; actual cost of delivered or sold inventories are carried at weighted average.

(3) Amortization of low-value consumption goods and packing materials

Low-value consumption goods and packing materials are amortized using one-off amortization method when they are put into use.

(4) Year-end inventory valuation, impairment recognition and provision

Year-end inventories are carried at the lower of cost and net realizable value. Based on wall-to-wall inventory at the end of the period, provision for inventory write-down is retained at the difference between cost and net realizable value of inventory on the individual item basis in the following circumstances, where the net realizable value is lower than the cost. For inventory of large quantity and low unit price, provision for inventory write-down may be recognized by category. The net realizable value is defined by selling price deducts estimated complete cost, selling cost and related tax.

a. The market price of inventory continues to fall with no hope of recovery in the foreseeable future;

b. The product using the raw material is manufactured at a cost higher than the selling price thereof;

c. The existing raw material fails to meet the needs of new products as a result of product upgrading and the market price of such raw material is lower than its carrying cost;

d. The goods or services are obsolete or there is a preference-driven change in market needs, resulting in a gradual decline in the market price thereof;

e. Other circumstances demonstrating a substantial impairment of inventory.

9. Long-term equity investments

(1) Determination of investment costs

For a long-term equity investment obtained through a combination of entities under common control, the carrying value of the owner's equity in the combined entity stated in the ultimate controlling party's consolidated financial statements should be recognized on the combination date as investment cost.

For a long-term equity investment obtained through a combination of entities not under common control, the combination cost should be accounted for the cost of the long-term equity investment.

For long-term equity investments obtained in a manner other than combination of entities, if a long-term equity investment is obtained through payment of cash, the actual purchase price thus paid should be recognized as initial cost of the long-term equity investment; if a long-term equity investment is obtained through issuing equity securities, the fair value of the equity securities being issued should be recognized as initial cost of investment.

(2) Subsequent measurement and profit or loss recognition

a. Long-term equity investments under cost method

The Company's long-term equity investments in its subsidiaries are accounted for using the cost method. Except for cash dividends

or profit distributions declared but not yet distributed that have been included in the price or consideration paid in obtaining the investments, the Company recognizes its share of the cash dividends or profit distributions declared by the investee as investment income for the current period.

b. Long-term equity investments under equity method

Long-term equity investments in associates and joint ventures are accounted for using the equity method. When the initial cost of investment is bigger than the proportionate share of the fair value of the investee's identifiable net assets at the time of investment, no adjustment to the initial cost of such long-term equity investment is made; When the initial cost of investment is smaller than the proportionate share of the fair value of the investee's identifiable net assets at the time of investment, the gain in profit is recognized.

The investor's share of the net profit or loss and other comprehensive income of the investee is recognized in investment income and other comprehensive income respectively, along with the adjustment to the carrying amount of the long-term equity investment; distributions of profits or cash dividends received from the investee reduce the carrying amount of the investment; adjustments in the carrying amount of the investment for the changes in the owner's equity other than those arising from the investee's net profit or loss, other comprehensive income and profit distribution are necessary and recognized as owner's equity.

The investor's share of the net profit or loss of the investee is based on the fair value of the investee's net identifiable assets upon acquisition of the investment and recognized after adjustment to the investee's net profit made in accordance with the investor's accounting policies and fiscal periods. Accounting of investments held should be based on the investor's share of the amount of net profit, other comprehensive income and other changes in the owner's equity listed in the investee's consolidated financial statements.

The investor's share of the loss of the investee should be accounted for as follows: i) writing down the carrying value of the long-term equity investment; ii) in the event that the carrying value of such long-term equity investment is not enough for write-down, investment loss should be recognized as much as the carrying value of long-term interests that, in substance, form part of the net investment in the investee to write down the carrying value of long-term receivables, etc.; and iii) additional obligations assumed by the investor under the investment contract or agreement should be recognized as estimated liabilities and taken into investment loss of the current period. If the investee makes a profit in subsequent periods, the carrying amount of estimated liabilities should be written down in reverse sequence after deduction of the share of unrecognized loss, and the carrying value of long-term interests that, in substance, form part of the net investment in the investee as well as the carrying value of the long-term equity investment should be restored with investment income recognized accordingly.

c. Disposal of long-term equity investments

For disposal of long-term equity investments, the difference between the carrying amount and the actual purchase price is recorded into profit or loss for the current period.

Upon disposal of a long-term equity method investment, all amounts previously recognized in the Company's other comprehensive income in relation to that investment are accounted for on the same basis as would have been required if the investee had directly disposed of the related assets or liabilities. The changes in the owner's equity other than those arising from the investee's net profit or loss, other comprehensive income and profit distribution are transferred to profit or loss for the current period in proportion.

If the investor loses joint control or significant influence over an investee for reasons such as partial disposal of the equity investment, any retained interest should be recognized in profit or loss for the current period, and measured as a financial instrument at the difference between fair value and carrying value at the date when joint control or significant influence is lost. All amounts previously recognized under the equity method as other comprehensive income in relation to such equity investment are accounted for on the same basis as would have been required if the investee had directly disposed of the related assets or liabilities. The changes in the owner's equity other than those arising from the investee's net profit or loss, other comprehensive income and profit distribution are transferred to profit or loss for the current period.

In the event that the investor loses control over an investee for reasons such as partial disposal of the equity investment, when preparing separate financial statements, equity accounting is required for retained interest with joint control or significant influence over the investee, and adjusted on the basis of equity accounting as would have been required upon acquisition of such interest; retained interest without joint control or significant influence over the investee should be recognized in profit or loss for the current period and measured as a financial instrument at the difference between fair value and carrying value at the date when control is lost.

In the event that equity interest being disposed of has been acquired through a combination of entities for reasons such as additional investment, when preparing separate financial statements, all amounts previously recognized under the equity method as other comprehensive income and other owner's equity in relation to such

equity investment should be transferred in proportion, if retained interest is accounted for at cost or under the equity method; all amounts previously recognized as other comprehensive income and other owner's equity should be transferred entirely, if retained interest is recognized and measured as a financial instrument.

(3) Determination of the basis for joint control and significant influence over the investee

Joint control means the contractually agreed sharing of control of an arrangement which exists only when decisions about the relevant activities require the unanimous consent of the parties sharing control. A joint venture is a joint arrangement whereby the parties that have joint control of the investee have rights to the net assets of the investee.

Significant influence means the power to participate in the financial and operating policy decisions of the investee but not control or joint control of those policies. For an investor with significant influence over the investee, the investee is considered an associate of the investor.

(4) Impairment test and provisions for impairment

At the end of the year, the long-term equity investment is reviewed and the provision for the impairment of the long-term equity investment is retained against the difference between the recoverable amount and the carrying value. Once the provision for the impairment of the long-term equity investment is retained, it should not be reversed during subsequent accounting periods.

For non-marketable long-term equity investment, impairment is likely in the following circumstances:

a. There is a change in the political or legal environment of the invested business, such as an enactment of or amendment to the tax and trade regulations, which may result in huge losses of the invested business;

b. The goods or services of the invested business are obsolete or there is a change in market needs, resulting in a serious deterioration in the financial conditions of the invested business;

c. The invested business has lost its competitive edge due to a major technological change etc. in the sector, resulting in a serious deterioration in the financial conditions of the invested business such as clean-up or liquidation;

d. Other circumstances demonstrating a substantial failure of the invested business to generate economic benefits for the Company.

10. Revenue

Revenue should be recognized when a performance obligation in the contract is satisfied, i.e. control of goods or services is passed to the customer. Where a contract has multiple performance obligations, the transaction price should be allocated to these performance obligations upon the effective date of contract by reference to the relative proportion of standalone selling prices of promised goods or services and revenue should be measured accordingly.

11. Government grants

(1) Types of government grants

Government grants comprise mainly of treasury funding, interest subsidies, tax rebates and free allocation of non-monetary assets etc.

(2) Acknowledgment of government grants

The Company has acknowledged government grants that it ineligible for and granted.

(3) Accounting treatment of government grants

Asset-related government grants are recognized as deferred income which is taken into profit or loss for the current period appropriately and systematically during the lifespan of related asset.

Income-related government grants used to recover relevant costs, expenses or losses in the subsequent period are recognized upon receiving as deferred income which is taken into profit or loss for the current period during the verification of related costs, expenses or losses; otherwise, recognized as non-operating income, or used to write down relevant costs, expenses or losses; those used to recover relevant costs, expenses and losses incurred by the Company are directly recognized as profit or loss for the current period; otherwise, recognized as non-operating income, or used to write down relevant costs, expenses or losses.

(4) Measurement of government grants

Government grants in the form of monetary assets are measured at the amounts received or receivable. Government grants in the form of non-monetary assets are measured at fair value.

12. Deferred tax assets and deferred tax liabilities

Deferred tax assets and deferred tax liabilities are recognized at (temporary) difference between the carrying value of an asset or liability and the tax base of such asset or liability. Deductible losses and tax credits that are carried forward to reduce taxable income in future years under the tax provisions are deemed temporary differences and accounted for deferred tax assets. Deferred tax assets and deferred tax liabilities as of the balance sheet date are measured at the applicable rate for the period when such assets or liabilities are estimated to be recovered or settled.

Deferred tax assets are limited to the taxable income that is likely to be obtained to reduce temporary differences, deductible losses and tax credits. For recognized deferred tax assets, when it is unlikely to obtain sufficient taxable income to offset against deferred tax assets by the future period, a write-down of the carrying amount of deferred tax assets is necessary. If it is likely to obtain sufficient taxable income, the write-down amount should be reversed.

Deferred tax assets and deferred tax liabilities are presented on a net basis, provided that the following conditions are satisfied:

(1) Deferred tax assets and deferred tax liabilities are related to the income tax imposed by the same taxing authority on the same entity in the Company.

(2) Such entity in the Company has the legal right to offset current tax assets against current tax liabilities.

13. Changes in accounting policies during the reporting period

The Company has implemented since January 1, 2020 Accounting Standards for Enterprises No.14 – Income as amended by the Ministry of Finance in 2017. Adjustments have been made in accordance with the new standards on income in the event of any discrepancy between the previously recognized and measured items and the revised requirements as on January 1, 2020. For any inconsistency with the revised requirements in the financial data reported in the comparative statements for prior periods, no adjustments to the information of these comparative periods were made. The Company has recognized the cumulative effect of initial application of the new standards on income as an adjustment to the opening balance of retained earnings and other relevant items in the financial statements as on January 1, 2020.

B. Main Types of Taxes

1. Corporate income tax

The taxable amount in calculating the corporate income tax is based on the taxable income and the applicable tax rate is 15% or 25%.

In accordance with the Directive on Tax Policy Issues in Relation to the Further Implementation of the Western China Development Strategy (CS [2011] NO.58) announced by the Ministry of Finance, the General Administration of Customs and the State Taxation Administration, business establishments in the industries encouraged to develop in the western region are entitled to a reduced corporate income tax rate of 15% from January 1, 2011 to December 31, 2020. This preferential rate of 15% is applicable to the calculation and payment of corporate income tax of some of the Company's branches and subsidiaries located in western China. In accordance with the Announcement on Continuing the Corporate Income Tax Policy for the Western Development Strategy ([2020] No. 23) jointly issued by the Ministry of Finance, the State Taxation Administration and the National Development and Reform Commission, business establishments in the encouraged industries in the western region are still entitled to the reduced corporate income tax rate of 15% from January 1, 2021 to December 31, 2030.

Under the Corporate Income Tax Law, Implementing Regulations of the Corporate Income Tax Law, Administrative Measures for the Determination of High and New Technology Enterprises (GKFH [2016] No.32) and Guidelines for Eligibility Management of High and New Technology Enterprises (GKFH [2016] No.195), the corporate income tax rate applicable to a high and new tech company is 15%. The Company's subsidiaries with the High and New Technology Enterprise Certificate are eligible for the preferential tax rate of 15%.

The overseas investment projects and subsidiaries of CNPC are subject to the applicable local tax rates in accordance with the contracts and relevant tax regulations of the host country.

2. Value-added tax (VAT)

The taxable amount in calculating the VAT is based on the value added. The VAT payable is calculated by multiplying the taxable sales amount by the applicable tax rate and deducting the input tax deductible in the current period. The applicable tax rate is 6%, 9%, or 13%.

In accordance with the Directive on the Relevant Policies for Deepening Value-added Tax Reform ([2019] No.39) issued by the Ministry of Finance, the State Taxation Administration and the General Administration of Customs, the new tax rates of 13% and 9%, instead of 16% and 10%, are applicable to taxable sales and imports respectively, effective since April 1, 2019.

In accordance with the Directive on the Relevant Policies for Deepening Value-added Tax Reform ([2019] No.39) issued by the Ministry of Finance, the State Taxation Administration and the General Administration of Customs, taxpayers in producer and consumer services (including financial services) are eligible for incremental tax credit from April 1, 2019 to December 31, 2021 by adding 10% to the input tax deductible in the current period.

In accordance with the Directive on Proportional Refund of Import VAT on Natural Gas Imports from 2011 to 2020 and Central Asia Natural Gas Imports before 2010 (CGS [2011] No.39) issued by the Ministry of Finance, the General Administration of Customs and the State Taxation Administration, when the cost of imported natural gas from the permitted projects is higher than the government-regulated natural gas sales price, the Company is eligible for import VAT refund in proportion to the difference between the import cost and the regulated sales price.

In accordance with the Notice on Printing and Distributing VAT Management Measures for Oil and Gas Enterprises (CS [2009] No.8) and the Supplementary Directive on VAT-related Issues for Oil and Gas Enterprises (CS [2009] No.97) issued by the Ministry of Finance and the State Taxation Administration, the Company is subject to VAT on production-related services provided in the process of producing oil and gas and exempt from VAT on the transfer or supply of taxable goods and services for production between the oil and gas field companies and the non-independent accounting units.

Overseas subsidiaries are subject to the applicable local tax rates.

3. Surtaxes and surcharges

The urban maintenance and construction tax rate is 1%, 5% or 7% of the amounts actually paid for value-added tax and consumption tax. The rate of education surcharge is 3% of the amounts actually paid for value-added tax and consumption tax.

4. Consumption tax

The taxable amount in calculating the consumption tax is based on the sales volume of taxable products. The amount of the consumption tax payable is RMB 1.52 per liter for gasoline, naphtha, solvent oils and lubricants, and RMB 1.20 per liter for diesel and fuel oils.

In accordance with the Directive on Increases in Fuel Consumption Tax (CS [2015] No.11) announced by the Ministry of Finance and the State Taxation Administration, the unit consumption tax amount has increased from RMB 1.40 to RMB 1.52 per liter for gasoline, naphtha, solvent oils and lubricants, and from RMB 1.10 to RMB 1.20 per liter for diesel, jet kerosene and fuel oils, effective since January 13, 2015. The suspension of consumption tax remains unchanged for jet kerosene.

In accordance with the Directive on Consumption Tax Exemption for Oil Consumption in the Production of Oil Products (CS [2010] No.98) announced by the Ministry of Finance and the State Taxation Administration, the Company has been exempt from consumption tax since January 1, 2009 on self-produced refined oils used as fuel, power and raw materials to produce oil products.

In accordance with the Provisional Directive on Consumption Tax Refund (Exemption) for Naphtha and Fuel Oil Used in Producing Ethylene and Aromatic Hydrocarbons ([2012] No.36) issued by the State Taxation Administration, the Company is exempt from consumption tax on self-produced naphtha and fuel oil for continuous production of ethylene and aromatic hydrocarbons, and also exempt from consumption tax on self-produced naphtha and fuel oil sold under the dedicated direct supply programs announced by the State Taxation Administration.

5. Resource tax

The taxable amount in calculating the resource tax is based on the sales volume of taxable resource products such as crude oil, natural gas and shale gas, and the applicable tax rate ranges from 1% to 6%.

In accordance with the Resource Tax Law of the People's Republic of China, CNPC is eligible for resource tax exemption for crude oil and natural gas used for heating during the process of crude oil production and transportation in oilfields and eligible for a resource tax reduction of 20% for crude oil and natural gas produced from low abundance fields; 30% for sour gas, and crude oil and natural gas produced by means of tertiary recovery or deep-water operations; and 40% for heavy oil and high pour point oil.

In accordance with the Directive on Cutting Resource Tax on Shale Gas (CS [2018] No.26) announced by the Ministry of Finance and the State Taxation Administration, resource tax on shale gas is cut by 30% (from the standard rate of 6%) from April 1, 2018 to March 31, 2021 to boost shale gas production and increase gas supplies.

6. Special oil gain levy

The taxable amount in calculating the special oil gain levy is based on the excess income from the domestic crude oil sales with price exceeding a certain level, and the applicable tax rate ranges from 20% to 40%.

In accordance with the Directive on Raising the Threshold for Special Oil Gain Levy (CS [2014] No.115) issued by the Ministry of Finance, with the approval of the State Council, the Ministry of Finance has decided to raise the threshold for special oil gain levy to USD 65 per barrel, effective from January 1, 2015, with the five-level progressive ad valorem rates remaining in place.

Major Events

January

Jan. 19

Ultra-deep (>8,000m) exploration activities in the Tarim Basin achieved significant results (well Luntan-1 completed at a depth of 8,882 meters).

Jan. 28

The Abu Dhabi Onshore-Offshore Project Phase-I under a joint venture agreement became fully operational.

March

Mar. 30

The production sharing contracts for the Buzios and Aram blocks in Brazil were concluded between CNPC and its partners.

April

Apr. 8

Ultra-deep exploration activities in the Tarim Basin made a major breakthrough (well Manshen-1).

Apr. 17

Shale oil exploration activities in the northern Songliao Basin made significant achievements.

May

May 04

A new gas-abundant zone was identified in the Central Sichuan Basin (well Pengtan-1).

May 20

A strategic cooperation framework agreement was inked by CNPC and China Anneng Construction Group.

May 26

A framework agreement with CNOOC was signed to comprehensively deepen strategic cooperation.

September

Sep. 02

A framework agreement with China National Machinery Industry Corporation was entered into to deepen strategic cooperation.

Jan. 28

Apr. 8

Oct. 24

October

Oct. 24

Daqing Petrochemical Company's refining plant restructuring/upgrading project was fully commissioned.

November

Nov. 05

CNPC International Cooperation Forum & Signing Ceremony was held in Shanghai during the third China International Import Expo.

Nov. 11

Exploration activities in the eastern Junggar Basin made a major breakthrough (well Kangtan-1).

Nov. 28

CNPC's first training course design competition ended successfully after nearly five months.

Nov. 30

The nameplate unveiling ceremony of Kunlun Digital Technology Company, a subsidiary of CNPC, was held in Beijing, marking an important step to advance digital transformation and intelligent development.

December

Dec. 14

The full-year natural gas output of Southwest Oilfield Company exceeded 30 billion cubic meters.

Dec. 16

A major breakthrough was made in natural gas exploration at the southern rim of the Junggar Basin (well Hutan-1).

Dec. 21

Tarim Oilfield Company's full-year production exceeded 30 million tons of oil equivalent.

Dec. 27

Changqing Oilfield Company's full-year production exceeded 60 million tons of oil equivalent.

Dec. 31

CNPC's full-year domestic production exceeded 200 million tons of oil equivalent for the first time, with natural gas output standing above 100 million tons oil equivalent.

Dec. 31

CNPC's overseas operations yielded an equity production of more than 100 million tons of oil equivalent for the second year in a row.

Nov. 05

Nov. 30

Dec. 27

Glossary

Proven reserves

According to China National Standards, proven reserves are estimated quantities of mineral deposits. They can be recovered from reservoirs proved by appraisal drilling during the period of reservoir evaluation, with a reasonable certainty or a relative difference of no more than 20%.

Oil equivalent

Oil equivalent is the conversion coefficient by which the output of natural gas is converted to that of crude oil by calorific value. In this report, the coefficient is 1,255, i.e. 1,255 cubic meters of natural gas is equivalent to one metric ton of crude oil.

Recovery rate

The percentage of oil/gas in place that is recoverable from underground.

Decline rate

A decline in production occurs in an oil or gas field that has been producing for a certain period of time. The natural decline rate is defined as the negative relative change of production over a period of time, without taking into account an increase in production resulting from EOR (enhanced oil recovery) techniques. The general decline rate is defined as the rate of decline in the actual production of such an oil or gas field, taking into account an increase in production from the new wells and EOR techniques.

Water injection

The pressure of the reservoirs continues to drop after the oilfield has been producing for a certain period of time. Water injection refers to the method where water is injected back into the reservoir through the water injection wells to raise and maintain the pressure, increase oil recovery, and thereby stimulate production.

Tertiary recovery

Tertiary recovery is also called enhanced oil recovery and is abbreviated as EOR. It is a method to increase the recovery of crude oil by injecting fluid or heat to physically or chemically alter the oil viscosity or the interfacial tension between the oil and another medium in the formation, in order to displace any discontinuous or hard-to-tap oil in reservoirs. EOR methods mainly include thermal recovery, chemical flooding and miscible flooding.

ASP flooding

A flooding system is prepared with alkali, surfactant and polymer. It not only has a high viscosity but also can create ultra-low water-oil interfacial tension to improve the oil-washing capability.

LNG

Liquid Natural Gas is produced by dewatering, deacidifying, dehydrating and fractionating the natural gas produced from a gas field and then turning it into liquid under low temperatures and high pressure.

Horizontal well

A class of directional wells where the wellbore axis is near horizontal, or more or less 90 degrees deviation. A horizontal well may produce at rates several times greater than a vertical well, enhance recovery efficiency and prolong the production cycle, due to the increased wellbore surface area within the producing interval. Meanwhile, the environmental costs or land use problems that may pertain in some situations, such as the aggregate surface "footprint" of an oil or gas recovery operation, can be reduced by the use of horizontal wells.

HSE management system

The HSE management system provides a framework for managing all aspects of health, safety and the environment. It is defined as the company structure, responsibilities, practices, procedures, processes and resources for implementing health, safety and environmental management.

Occupational diseases

A disease or ailment caused due to excessive exposure to noxious fumes or substances in a working environment.

Internet +

China's "Internet +" action plan refers to the application of the internet and other information technology in conventional industries. It is an incomplete equation where various internets (mobile Internet, cloud computing, big data or Internet of Things) can be added to other fields, fostering new industries and business development in China.

VOCs

Volatile organic compounds (VOCs) refer to organic compounds with saturated vapor pressure over 70Pa under room temperature, and boiling point below 260°C under atmospheric pressure. VOCs also refer to all organic compounds that easily evaporate at temperature of 20°C and vapor pressure of 10Pa or higher.

Carbon capture, utilization and storage (CCUS)

CCUS is a process of separating carbon dioxide (CO_2) from emission sources of industry or related energy industries and having it sequestrated in geological structures or utilized to prevent CO_2 from being released into the atmosphere. It is a technical system aimed at reducing man-made carbon dioxide emissions.

Carbon neutrality

A state in which the net amount of man-made carbon dioxide emissions is reduced to zero because it is balanced by actions to offset these emissions.

About this Report

In this report, the expressions "CNPC", "the corporation", "the company" and "we" are used for convenience where references are made to China National Petroleum Corporation. This report is presented in Chinese and English. In case of any divergence of interpretation, the Chinese text shall prevail.

Recycled/recyclable paper is used for this report.

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